Design Engineering

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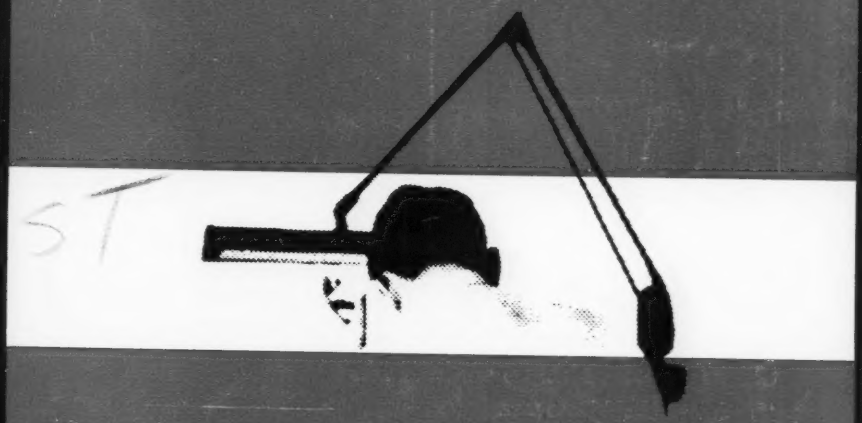
FEATURE REPORT

A look at the Canadian drawing office



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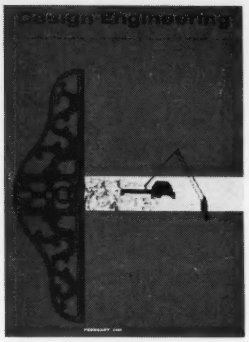

Design Engineering

Vol. 6 **FEBRUARY 1960** No. 2

This month's cover

Better design for the drafting room is DE's editorial theme for February. Artist Bryan Mills put his imagination to work and came up with a terse, perhaps acid, evaluation of the subject. But man on the cover seems oblivious to the illuminating treatment he gets *inside* the book.

★ ★ ★

Design Engineering

MEMBER

CCAB

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1 The tube is a reinforced epoxy housing that protects:
(a) a communications antenna *(b) a radio transmitter*
(c) miniature rockets

2 Its ignition coil, completely embedded in epoxy, is safe from:
(a) moisture *(b) temperature extremes*
(c) shock

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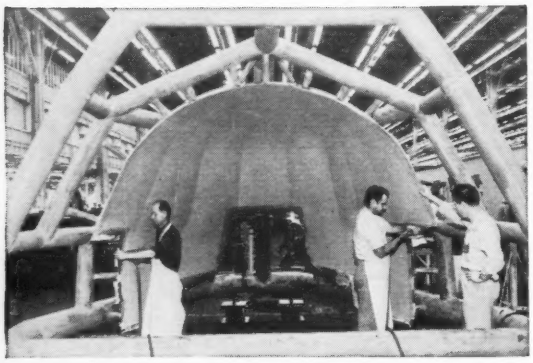

3 This airplane construction tool of epoxy-glass cloth:
(a) checks dimensions of fuselage *(b) supports the frame*
(c) is part of the mock-up

4 This tough, strong, pleasure boat hull is made from:
(a) laminated epoxy and glass fiber *(b) epoxy-coated wood*
(c) epoxy-coated metal

5 Their trip to school is safer in a bus with:
(a) epoxy-glass fiber seat frames *(b) an epoxy-sand coated floor*
(c) epoxy-embedded electrical parts

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3. (a) Checks dimensions—it's lightweight and extremely accurate.
4. (a) Epoxy-glass laminate—but epoxy coatings are great on other hulls.
5. (b) They won't slip on this floor's tough, gritty surface.

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Authors

South Pacific had explosive sound-track

Philadelphian **Russell M. Shepherd** is a U of Pennsylvania man now living in Toronto — wrote "Cost-cutting with automated microfilm". During World War II, he organized the Pacific bureau of the Foreign Broadcast Intelligence Service — was later appointed director of the division. He now helps direct one of the world's largest suppliers of drafting, engineering and surveying instruments and materials. Shepherd is a member of the Optical Tooling Engineers Association and the Graphic Reproduction Association of Toronto.

Calisthenics in the cockpit?

Yoga every day, flying, chess keep **Win Straube,** author of "Fatigue — greatest enemy of accuracy", on the active list. Being vp and executive director of Kuhlmann Straube Co. turns the screws tighter. But Straube loves it. And as a crusader for modern engineering equipment, he has an axe to grind about drafting facilities. Straube has a B.A. in business administration from Frankfurt U — came to Canada in 1953.

Raising steam and an heir

Alex MacDonald handles the Raised Eyebrows Department with his piece on "The Canadian engineer as a lawmaker". His fact-digging unearthed some chilling truths viz., only nine out of 33,000 engineers hold elected office in provincial or federal parliaments. Who cares? "A lot of important people in Canada *do* care," says MacDonald. "Many government leaders think engineers are unusually qualified to assume national roles. It's the engineers themselves who're indifferent." MacDonald is a writer with Maclean-Hunter editorial services. His hobby used to be sailing "Miniature" his 30 ft. schooner. Now time evaporates as he ogles his new son and heir, Dave.

Mixture of maths and burgees

The Vice-Commodore of Kingston Yacht Club wrote the article on advanced mathematical instruments. For **S. S. Lazier** is also Assistant Professor, Civil Engineering at Queen's University. His specialty: hydraulics, surveying, structural design. Lazier is also consultant to the Pulp and Paper Research Institute. A small boat racing enthusiast, he is CO of the Queen's COTC contingent.

From coal to compass

President of his namesake company, **James W. Stevenson** has been importing technical precision instruments since 1951. Before this, he was employed by the U. S. Government in Southern Germany. For some years he worked in his family's coal importing business — but had sharper things lined up for his future. Stevenson has two teen-age children, says photography, swimming and boating are his hobbies.

French electronics sound different

Well entrenched as a DE contributor, **W. H. (Bill) Sheppard** (Perspective projections simplified) is now a demonstrator in the mechanical engineering department of McGill University. In his spare time, he is taking a refresher course in electronics, in French; expects to spend the summer on the DEW line. Sheppard of course is a bachelor.

Shepherd

Straube

Lazier

Stevenson

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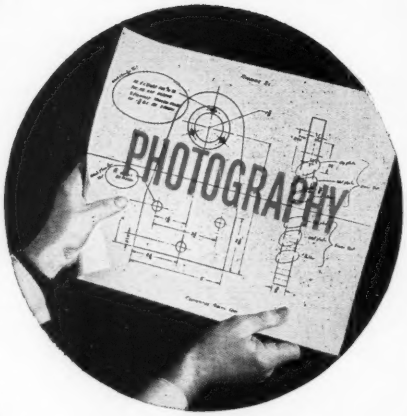

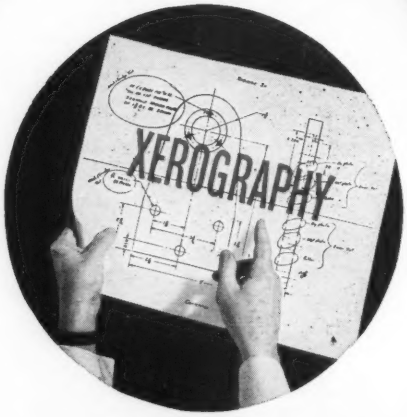

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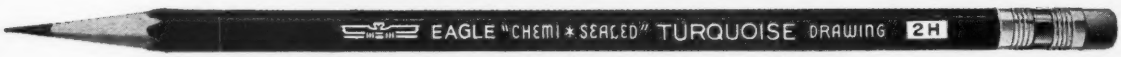

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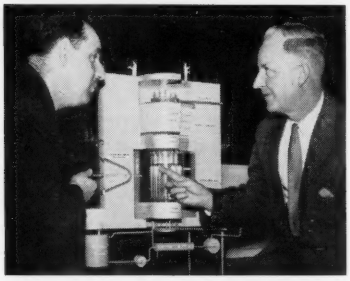
Reports

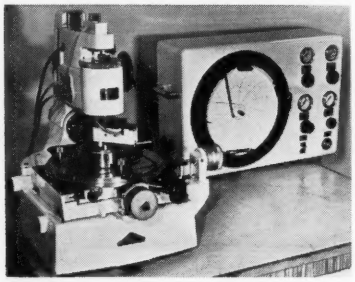
A news roundup of items of engineering and design interest from the world over

Publicity boost for Canada's nuclear power industry



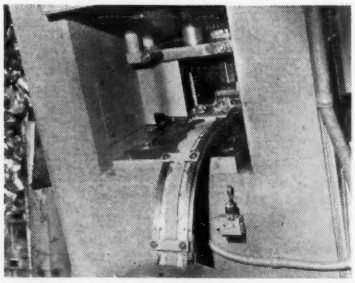
The story of Canada's uranium and nuclear power industries is being told in the marbled halls of Toronto's Royal Ontario Museum. Originated by the Uranium Producers Committee of the Canadian Metal Mining Association, the exhibition is open to the public through April 30. Intricate models of reactors and mills, photographs and samples of ore and cobalt bomb cancer therapy machines are included. Object of the show is to depict Canada as a world leader in nuclear power research. In this photograph Ray Phelps of the Hydro-Electric Power Commission of Ontario and S. G. Ferrar (right) of the Canadian Metal Mining Association, examine a cutaway model of the NRX reactor. NRX is research unit at Chalk River.

New ultra-accuracy in measuring roundness



Some engineering notes sent from Britain tell us that a machine for measuring roundness with unusual accuracy has been developed. The machine is suitable for setting up standards, yet available at a price that makes it suitable for general workshop or production inspection. The gauging pick-up on the machine is carried by a spindle revolving in an air bearing. A concentricity of .000005-in. is maintained, and the bearing needs a working pressure of 60 lbs. sq. in. The pick-up is power-rotated at one r.p.m. and bears a stylus to contact the work periphery. As the spindle rotates, the stylus moves round the periphery of the component under inspection — produces a signal in the pick-up head. Signal is amplified then fed into a chart recorder indicating the state of roundness in documentary form.

Top speed: 120 aluminum cans per minute

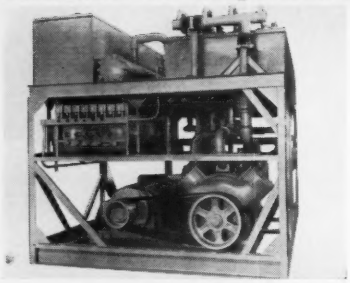


The machine shown here produces 120 aluminum beer cans per minute. We understand this is twice as fast as any other impact extrusion equipment available. The 11-oz. cans are made on a 400-ton, straight side and single action press. It is equipped with a variable speed motor and can operate at any speed between 40 and 120 strokes every minute. Blanks are fed by means of a hopper directly connected to the press drive for accurate timing. The can bodies are made from 2S aluminum blanks of 2½-in. diameter and ⅛-in. thickness. Wall thickness of the extruded can is 0.010-in. Made by the E. W. Bliss Co., the press saves storage and shipping charges, as it's only necessary to transport the blanks. Of course what goes in the can is none of our business.

You need scissors for your next paint job

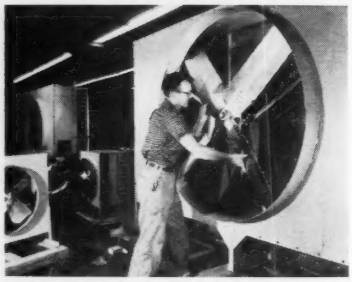
The girl is peeling off a sheet of pre-dried, self-adhesive paint. This means that any objections you've had to painting by brush or roller, are no longer valid in your wife's eyes. The pre-dried paint comes in sandwich form — sealed between two layers of paper. One protects the adhesive, the other the paint surface. To apply, first cut the paint film to exact size needed. Then strip off the backing on the adhesive side and press to the surface. Once in place, remove top layer of paper and presto! you have a bright, new painted surface ready for years of hard use. The odorless, streakless, paint has been tested on walls, airplane wings, furniture and signs. Morgan Adhesives Co. dated the brush and bucket routine.

Extremes of temperatures used with honeycomb brazing



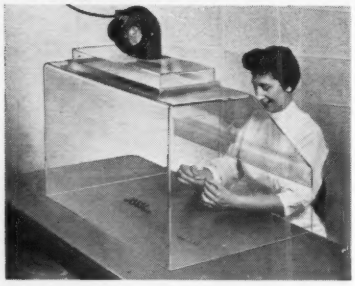
When using a new method of making aircraft wings by honeycomb brazing, extreme and arbitrary temperatures are needed. Wing sections get brazed at 1,650 F, are air-cooled to 100 F then frozen to —120 F. The big chill is not easy—in fact takes a living room size deep freezer (one shown is 16 ft wide x 26 ft long). It is thought to be one of the first of its size ever fabricated. Made by Tenney Engineering, the unit can process a mass load of 14,000 lb in about 150,000 lb of methylene chloride brine. Another freezer is being built to half-as-big-again capacity. But you won't see these units in year-end clearance sales; the price tag reads $140,000.

No secret to this cost-cutting operation



Another cost-cutting story, this time in the manufacture of housings for cooling towers, condensers, evaporators. Eighty percent less welding requirements, greatly reduced scrap losses and a 72-in. steel sheet instead of the 48-in. one make up the secret. Hand in hand with the savings are simplified design and fabrication techniques and improved product appearance. Front panel of this Halstead and Mitchell 40-ton air-cooled condenser was made in one piece. By using similar 72-in. size of steel sheet, the bottom pans of water cooling towers are being made in one piece. Corner welds only are then needed. By using this method, much of the firm's equipment has been improved in over-all design plus substantial savings in fabrication costs.

Plexiglas hood filters dust particles to 0.5 micron

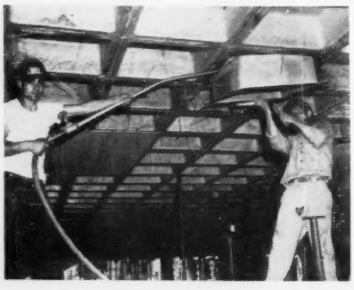


The dust hood shown here can be an inexpensive way of eliminating airborne dust during laboratory, assembly or inspection operations. It allows full visibility and unimpeded movement of arms and hands. A quiet blower at the top of the unit forces room air into the dust hood through a large area filter. This removes dust particles down to 0.5 micron diameter and provides positive pressure which prevents unfiltered room air from entering the open front of the unit. The "Microvoid" hood weighs 35 lb. and can be custom made to fit microscopes and other special equipment. Air-Shields Inc. make this aid for high reliability programs.

Hot cell in the Santa Susana Mountains

Have you ever heard of the Santa Susana Mountains near Los Angeles? Well, they're the site of the largest privately-owned facility in the world for remote examination of radioactive materials, we are told. Its name is the Components Development Hot Cell. Fuel elements from the Sodium Reactor Experiment (SRE) and the Organic Moderated Reactor Experiment (OMRE) are examined in the facility. SRE and OMRE are experimental power projects conducted by Atomics International for the Atomic Energy Commission. An unusual feature of the facility is its ability to maintain an inert atmosphere of less than one per cent oxygen in each operating cell. Shielding is provided by 42-in. thick concrete walls which separate the cells from the operating gallery. There are nine operating stations.

Waffle floor sections slash construction costs



While reinforced concrete is still an economical way of constructing large buildings, it has limitations. For example the practical maximum distance between two columns for unsupported concrete slabs is 26 ft. More than this, and the additional thickness becomes too costly and impractical architecturally. One answer to this problem is shown here — reinforced plastic forming-pans to create waffle-type floor sections. Molding the concrete in waffle forms saves up to 25% of the slab weight without strength loss. Less cost per sq. ft. of construction, more rental space and increased design flexibility, too. The plastic pans are made by Protective Plastics Ltd. and can be used up to 20 times.

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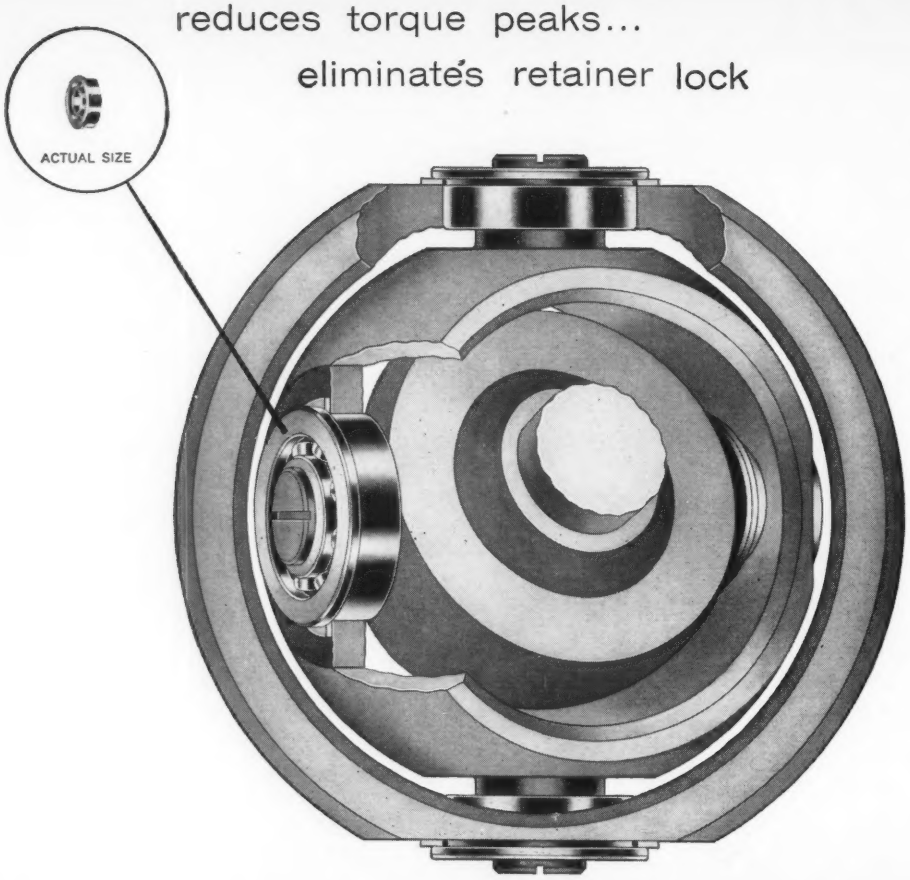
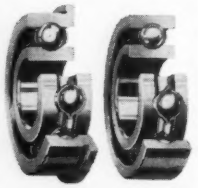


Low-torque reliability for gyros, synchros and other torque-sensitive components



"W" retainer bearings are available flanged or unflanged, shielded or open, in sizes most in demand 5/8" O.D. and under. For complete technical information write for engineering data sheet W-1.

An instrument bearing that passes all normal torque tests can develop excessive torque peaks in operation. In gyro gimbals, synchros and similar applications the result is erratic component performance. To solve this reliability problem, Barden developed the "W" ball retainer.

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Like other Barden advances in engineering and manufacturing, "W" retainers answer a specific performance problem. Other Barden Precision ball bearings satisfy such extreme demands as:

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Designews

Engineer or scientist?

"Basically, the distinction between science and engineering is simple," says D. R. Corson, Dean of Engineering, Cornell University, "because science is concerned with the discovery of knowledge and engineering is concerned with the application of already discovered knowledge.

"Sometimes, however, the line between science and engineering cannot be drawn at all. The pace at which new scientific information enters the technological world is so fast that the engineer often must be a competent scientist in his own right to be able to design the engineering product with which he is concerned," according to the Dean.

Gas turbines at Westinghouse

A multimillion dollar contract placed in December by Canadian Utilities Limited, Edmonton, with the Canadian Westinghouse Company marks the initial entry by this country's electrical manufacturing firms into the gas turbine field. This will be the first 25,000-kilowatt gas turbine generator to be completely engineered and built in Canada.

Nuclear reactor design

Not too many of Canada's designers will ever have the opportunity to work on a nuclear reaction design project—but developments in the field are always of interest.

For instance, we have been informed that another step to bring cheap nuclear power closer to reality was recently revealed at the annual ASME meeting. Essentially, the proposal is to eliminate the huge metal domes that now surround nuclear power plants (similar to the dome on the Indian reactor supplied by Canada under the Colombo Plan) by substituting a pool of cold water and a much smaller dome.

In current practice, steel domes are provided to protect the atmosphere and neighborhood. The domes have to be big enough and strong enough to hold all the escaping energy from all possible forms of accident. This proviso has been a very hard target to hit.

Athlone Fellowships

Forty-one young Canadian engineers will be selected in 1960 for two years' post-graduate training in industrial establishments or universities in the U. K. under The Athlone Fellowship scheme. Ten of these men will be engineers who have already been employed in industry.

Application forms are available from the Registrars of the major universities in Canada.

Young company with big order

Quebec Hydro Electric Commission has ordered an automatic data logger for its Charland Substation from Central Dynamics, Ltd. of Pointe Claire, Quebec. This young, all-Canadian organization is the first Canadian company to design and completely manufacture this type of equipment in Canada.

CISC Film Library

The Canadian Institute of Steel Construction maintains a 16 mm film library of interest to architects, engineers and engineering students. These films are excellent for showing at professional group meetings. Send requests for information to CISC, 388 Yonge St., Toronto.

New Quebec tube mill

Standard Tube and T.I. Limited, have expanded their facilities in the province of Quebec to keep pace with the economic growth of the area. Welded Steel Tubing is now being manufactured by the company in a new mill in Montreal.

Hydraulic turbine order

The largest single order for hydraulic turbines ever placed by a Canadian power utility was recently awarded to Dominion Engineering, Lachine, by the Quebec Hydro. The order—12 Kaplon type turbines, each rated at 60,000 hp, is for the giant Caillon power project.

3M buys Filmsort

Minnesota Mining and Manufacturing Company have moved into the microfilm field with the recent acquisition of The Filmsort Company, which will be operated as a division of 3M. Filmsort were one of the pioneers in the use of microfilm for engineering drawings.

Canadian boxcars on test

Ten heated boxcars which can maintain a constant temperature for as long as 40 days without refuelling are undergoing tests before entering service in the Atlantic region of the CNR.

The cars, which were designed in Canada, were built by the Eastern Car Company of Trenton, N.S. Once again, Canada is taking the lead in railway rolling stock design.

Design seminar

The University of Illinois will hold a two-day seminar on April 28 and 29 on "Aids in design room management". The seminar will deal with such topics as use of drawings in design of printed circuits, models as an aid in design and construction, applied psychology in management, auditing drafting work and management.

Other scheduled topics are present and future use of machines in connection with engineering drawings, use of tape to control machines, statistical control of tolerances, and microfilming.

For further information communicate with Prof. J. S. Dobrovolny, at the university in Urbana, Illinois. The seminar program sounds like an ideal follow-up course for this issue of DE.

Inventors exhibition

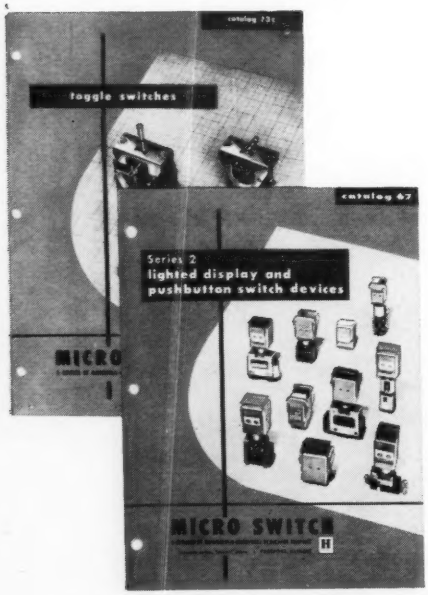
The ninth International Inventors Exhibition will be held in Belgium during March. At this most important technical exhibition only new inventions, from all fields, are shown. Many of them have never been displayed to the public previously. Many inventions from Canada and the United States are scheduled for the show.

For every switch requirement there's a MICRO SWITCH precision switch

with complete design information in these 9 catalogues

BASIC AIRBORNE SWITCHES are specially designed for use in airborne applications and can be installed in many different combinations of circuit, actuator and housing requirements. In addition, the characteristics of many of these switches make them suitable for use in automotive, transport or marine applications. Write for Catalogue 78.

AIRBORNE EQUIPMENT SWITCHES, enclosed in metal housings, include environment-proof switches, completely sealed against the effects of atmospheric changes, special roller-lever switches for exposed aircraft locations, hermetically-sealed sealed switches and high-temperature switches which will maintain dependable operation in any temperature from –65°F to 600°F. A wide variety of circuitry and actuation is available. Write for Catalogue 77b.



TOGGLE SWITCHES from MICRO SWITCH are available as single switches or multiple assemblies, as subminiature or conventional-sized switches and with hermetic sealing where required by environmental conditions. And, of course, there is a wide variety of mounting arrangements, electrical and mechanical characteristics. Write for Catalogue 73c.

MICRO SWITCH SERIES 2 lighted display and pushbutton switches represent the most significant advance in the pushbutton control and indicating field. All Series 2 units present a uniform panel-front appearance. Units are mounted without tools, with five different colors available, in eight different mounting schemes. Switching and indicating functions can be combined, or kept separate, to provide unlimited flexibility in design. Write for Catalogue 67.

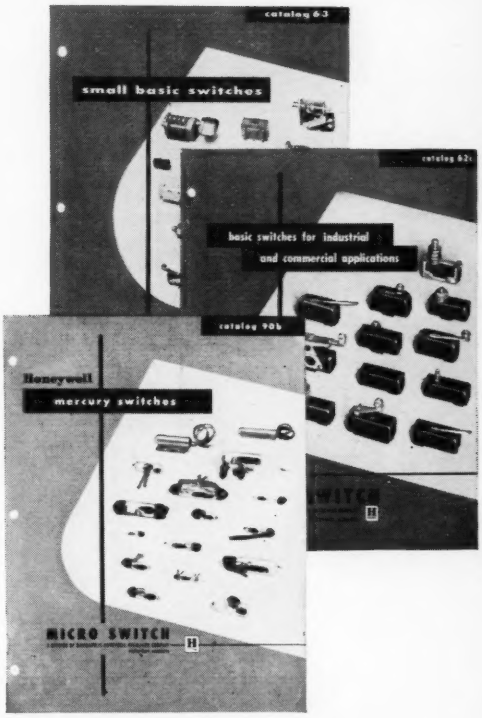
HEAVY-DUTY LIMIT SWITCHES are high capacity switches of extra-rugged construction and designed to stop a travelling mechanism at a predetermined point. Included is the famous "Plug-in Limit" switch that can be replaced in only 20 seconds and offers a choice of nine different actuators. Also available are explosion-proof limits and rugged models for applications where physical damage is possible. Write for Catalogue 84.

INDUSTRIAL ENCLOSED SWITCHES are precision snap-action switches in durable metal housings. Most have basic switches that are easily replaceable in the field and a wide range of actuating and mounting arrangements and electrical and mechanical characteristics. Included are explosion-proof, high-capacity, and general-purpose switches as well as hand and foot switches. Write for Catalogue 83c.

SMALL BASIC SWITCHES, often the size of a postage stamp or smaller, feature a long operating life and high electrical capacity for their size. These snap-action switches are available as "basics," with a host of different actuators, or as toggles, rotary selectors or push-buttons. Write for Catalogue 63.

BASIC SWITCHES can be used as limits, control switches and safety switches and are available in an almost unlimited number of different combinations of actuators, terminals and enclosures. They can be used alone, gang mounted, built into assemblies or enclosed in metal housings. Write for Catalogue 62c.

MICRO SWITCH MERCURY SWITCHES are often lower in cost than other types of switches and installation costs may also be lower because no operating mechanism is required. Mercury switches provide long, trouble-free operating life and are not affected by dust, fumes, spray or splash. MICRO SWITCH produces six basic types of mercury switches with more than 1,000 different designs. Write for Catalogue 90b.



Write today for any, or all, of these MICRO SWITCH catalogues. All MICRO SWITCH precision switches are laboratory-tested from raw materials to the completed product to ensure long, trouble-free operation. And, of course, special switches can be designed for special requirements. There's a MICRO SWITCH for every switching need and your local Honeywell office is ready to give you expert technical service on any problem. Or write Honeywell Controls Limited, *Precision Components Division*, Toronto 17, Ontario.

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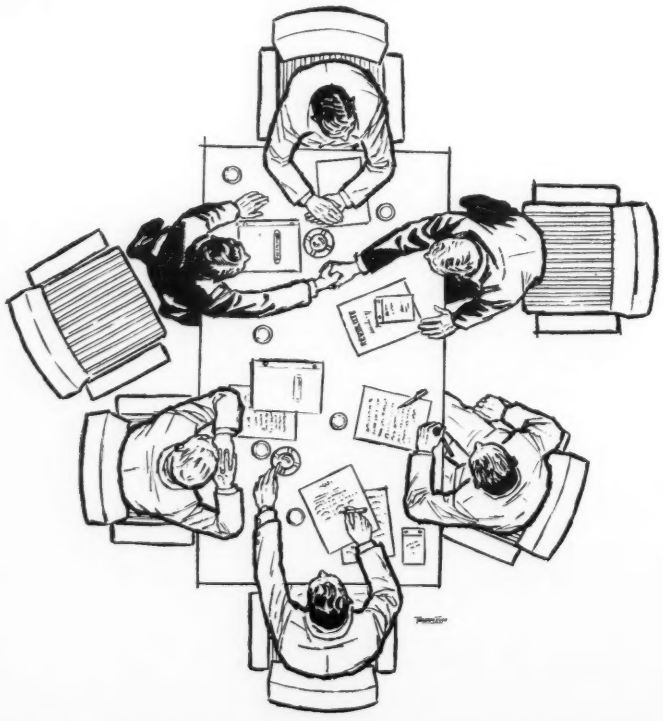

Whether you are an adherent of the "moist" or "dry" *whiteprinting* process you can now choose either from the great service organization created by the combining of the Bruning Company of Canada and Paragon Revolute (Canada) Ltd.

The models shown here are but a few of the many sizes and capacities awaiting your selection from the most complete range ever assembled. Whatever your needs in the whiteprinting field your requirements can be met completely with fine equipment of proven performance.

Bruning or Revolute equipment may be obtained on low cost, lease-purchase plans. Contact your nearest Bruning office for full information.

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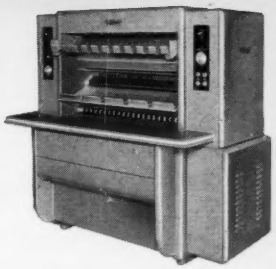
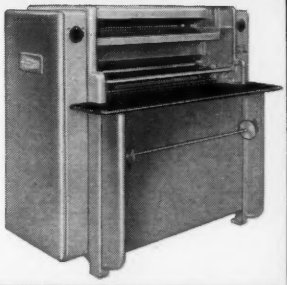
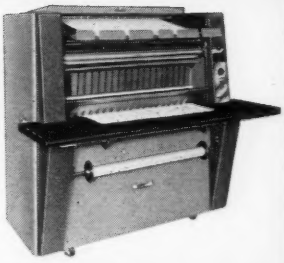
THE REVOLUTE STAR . . . a white-printing machine with automatic tracing separation, moderately priced, ruggedly constructed for a minimum of maintenance.



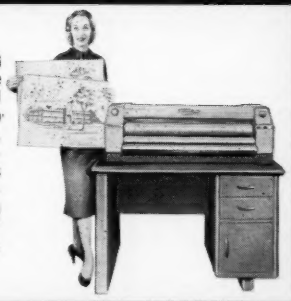
THE REVOLUTE METEOR "40" . . . simple to operate, easy to maintain . . . cast aluminum frame . . . quiet in operation and it is extremely easy to adjust speed.



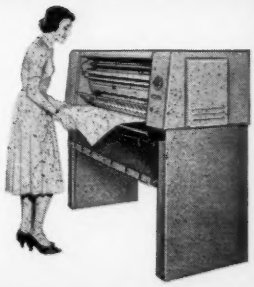
THE BRUNING "440" . . . spacious 42" printing width and a speed of 40 feet per minute . . . automatic separation and foot lever for releasing incorrectly-fed stock.



THE BRUNING "300" . . . one fingertip control turns this table top machine on or off, and compactly-designed it gives sharp black-and-white prints in seconds up to 30" wide by any length.



THE BRUNING "320" . . . a table-size whiteprinter with a 42" printing width at an economical price and with low operating cost. A mechanical speed of up to 25 feet per minute.



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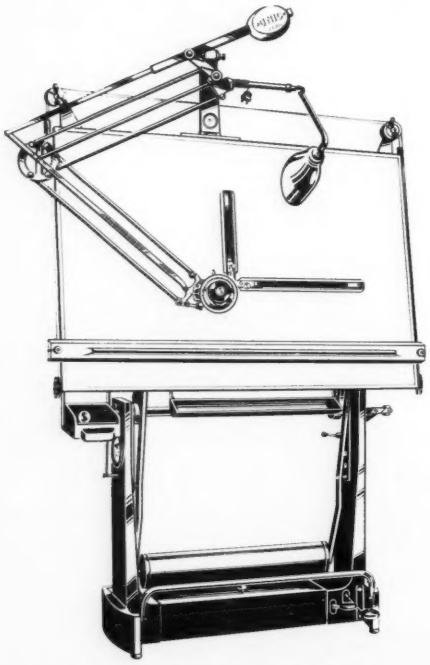

UNIC "CL2" TABLE AND MACHINE BOARD SIZE 40"x60". THE MOST RIGID AND PERFECTLY BALANCED DRAFTING TABLE AVAILABLE

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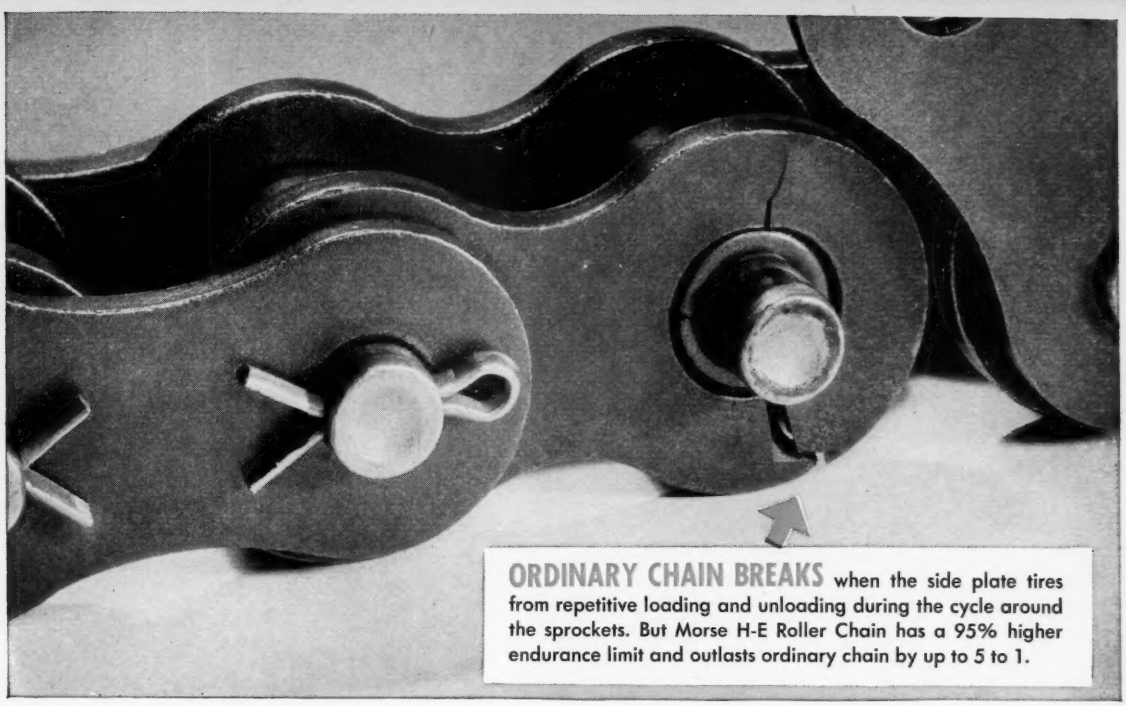


ORDINARY CHAIN BREAKS when the side plate tires from repetitive loading and unloading during the cycle around the sprockets. But Morse H-E Roller Chain has a 95% higher endurance limit and outlasts ordinary chain by up to 5 to 1.

"Tired Metal"... the bane of chain now licked by MORSE H-E

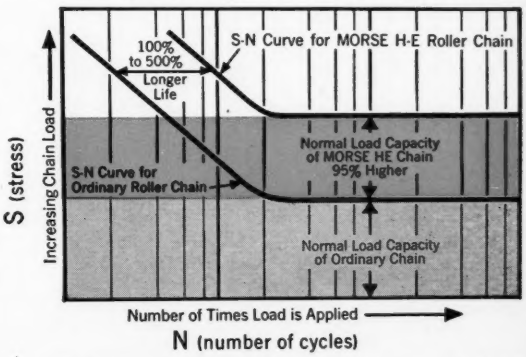
Morse H-E Roller Chain has up to 500% longer service life . . . cuts replacement and labor costs

The unretouched photograph shows what happens to chain when the metal fatigues. But now a special Morse process has licked the "tired metal" problem. It gives Morse H-E Roller Chain 95% higher endurance limit . . . and up to 500% longer service life.

The special process means Morse H-E Chain costs about 10% more. But that's a small price to pay for a heavy-duty chain that can save you thousands of dollars annually in replacement costs, downtime, and wasted man-hours.

For more information on the chain that licked the "tired metal" problem once and for all, see your local Morse Distributor. You'll find him listed in the Classified Directory under "Power Transmission." Or write: Morse Chain of Canada, Ltd.—a Borg-Warner Industry—Simcoe, Ontario. Phone GArfield 6-4960.

Chain Life: Morse High Endurance vs. Ordinary Roller Chain



Red area: Under these chain loads, fatigue will break ordinary chain . . . but *not* Morse H-E.

White area: Under these loads, fatigue will break ordinary chain and Morse H-E . . . but Morse H-E will have operated 100% to 500% longer.

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Announcing...
Ozalid's new 30-inch

STREAMLINER 100

Now you can have a compact table-top whiteprinter with "big machine" features at a slim-budget price. And you can enjoy the convenience of on-the-spot printmaking round the clock. Make all the prints you need, inexpensively and without delay. There's no make-ready or cleanup . . . anyone can learn to use the 100 in minutes. Check these important features:

- Makes prints up to 30" wide by any length
- Front and rear print stacking
- Simple dry-developing system
- Easy turn-on, turn-off controls
- Smooth-running electronic drive with speeds up to 14 fpm
- Hook-on tracing receiving tray (optional at extra cost)

And the versatile Streamliner 100 handles the whole range of Ozalid sensitized materials . . . lets you turn out gum-backed labels, photographs, cloth maps, or color transparencies!

For complete details on the new Streamliner 100, mail coupon today!

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Another Success Story in

Spring Design

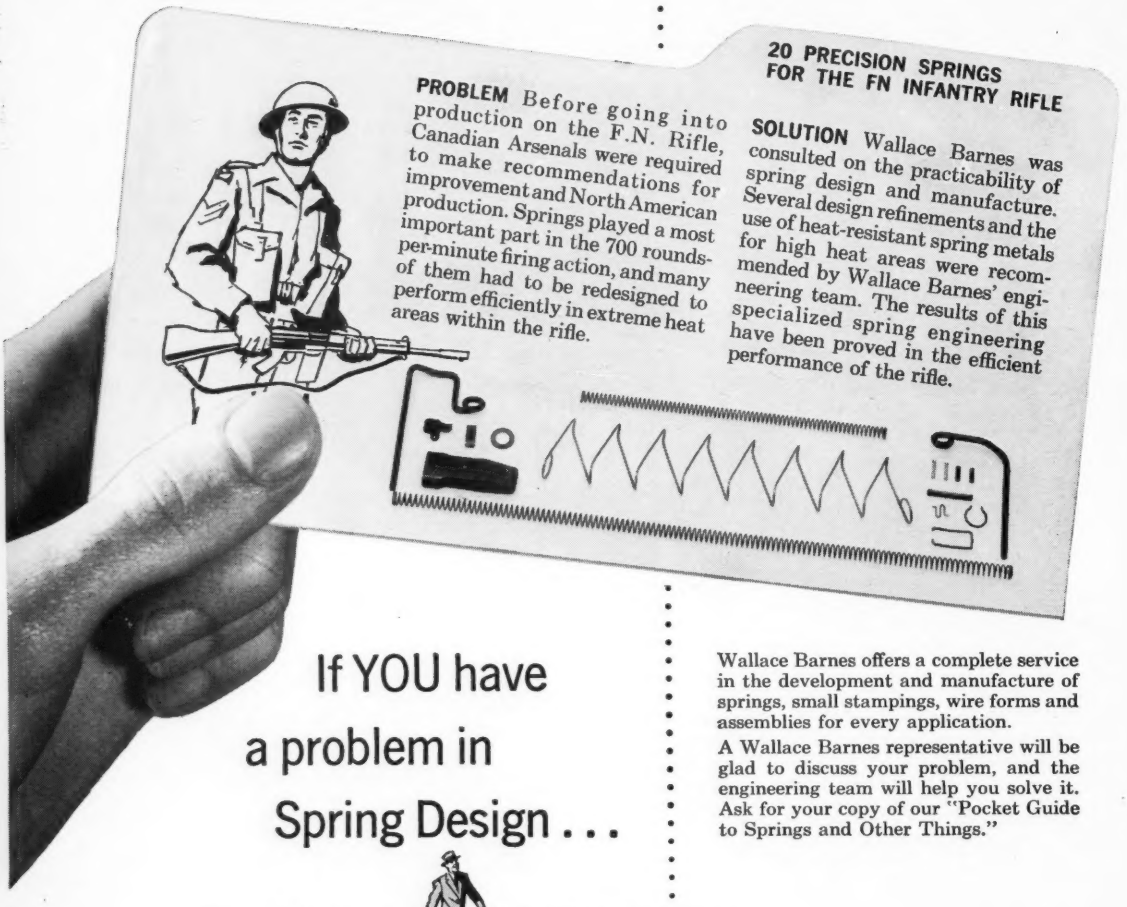
from the Case History Files of

WALLACE BARNES

This case history proves that specialized experience and creative engineering pay big dividends in the design and manufacture of springs, small stampings, wire forms and assemblies.

The engineering team at Wallace Barnes can very likely help cut your manufacturing costs, improve your product or help you solve a difficult design problem.

Take advantage of over 500 man-years' experience in spring engineering. We'd like to add *your* name to our success story files.



20 PRECISION SPRINGS FOR THE FN INFANTRY RIFLE

PROBLEM Before going into production on the F.N. Rifle, Canadian Arsenals were required to make recommendations for improvement and North American production. Springs played a most important part in the 700 rounds-per-minute firing action, and many of them had to be redesigned to perform efficiently in extreme heat areas within the rifle.

SOLUTION Wallace Barnes was consulted on the practicability of spring design and manufacture. Several design refinements and the use of heat-resistant spring metals for high heat areas were recommended by Wallace Barnes' engineering team. The results of this specialized spring engineering have been proved in the efficient performance of the rifle.

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Just call the man  from Wallace Barnes

Wallace Barnes offers a complete service in the development and manufacture of springs, small stampings, wire forms and assemblies for every application.

A Wallace Barnes representative will be glad to discuss your problem, and the engineering team will help you solve it. Ask for your copy of our "Pocket Guide to Springs and Other Things."

The Wallace Barnes Company Ltd.

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VIBRIN *Delivers Again!*

This time it's a rugged truck body, designed and molded by Scotian Fibreglas Products Ltd., of Stellarton, Nova Scotia. This company chose VIBRIN because it has proved a bear for punishment. It is hard to scratch and even harder to dent, and it is absolutely rust-proof. Its lighter weight also saves on gas. And VIBRIN permits better design and less costly custom-building.

VIBRIN is a polyester resin reinforced with glass fibre. Every day it improves on metal and wood in a multitude of products which include: furniture, building materials, watercraft, aircraft, and even railway locomotive parts.

You'll like the way VIBRIN needs neither heat nor pressure, and only the most inexpensive molds.

Naugatuck technical representatives are at your service, and the facilities of our development laboratories are available to help you evaluate Vibrin — and to improve present products or to create new ones. Simply contact Naugatuck Chemicals at Elmira, Ont., or our branches in Montreal, Toronto, Winnipeg or Vancouver.

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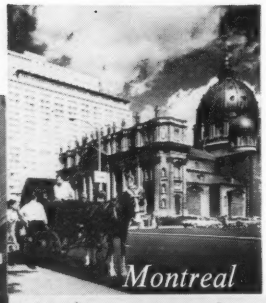
Atlas Steels have a fully stocked warehouse in every major industrial centre in Canada. This means that all tool and specialty steel orders can be filled, promptly and efficiently, right in your city. Due to their huge inventory, Atlas can look after all your requirements, large or small. Take advantage of the comprehensive Atlas metallurgical service too. It's just one more reason why you should specify Canadian made Atlas steels. Remember, their full facilities are just around the corner from you. Whenever you need specialty or tool steel, call the man from Atlas.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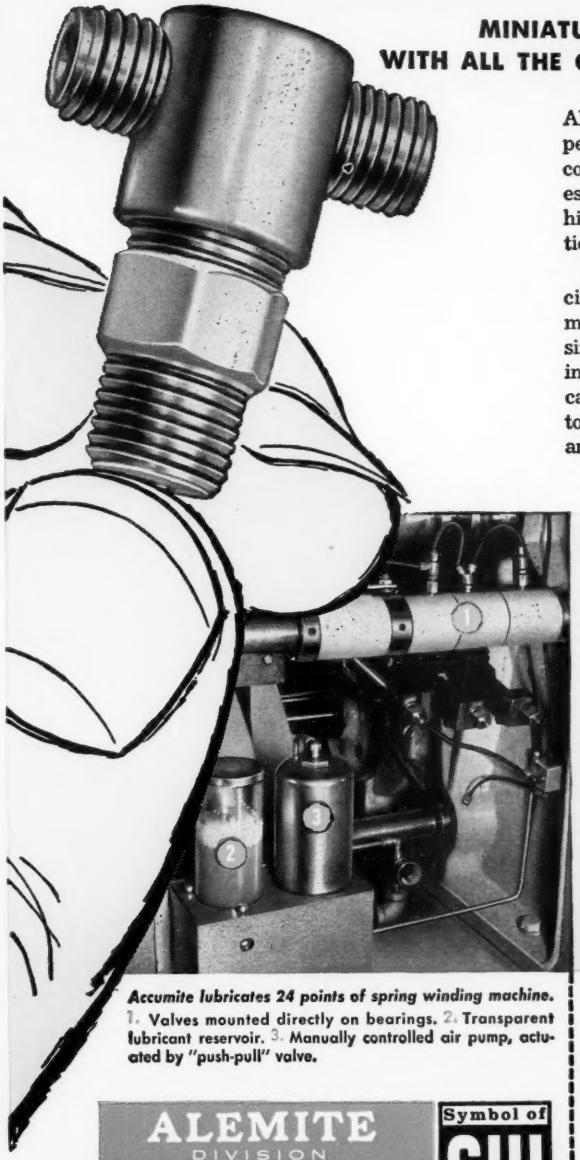
NOW! Any Machine Can Have The Advantages of Centralized Lubrication... At Low Cost!

Alemite "MINIATURE" ACCUMITE System



MINIATURE SIZE FOR LIMITED SPACE—
WITH ALL THE QUALITY OF HIGHER-PRICED SYSTEMS!

Alemite—with 40 years of centralized lubrication experience—announces an all-new miniature system complete with pump, metering valves and controls—especially designed to service many machines and vehicles where centralized lubrication has been impractical until now!

Alemite's new midget-size Accumite system is especially adaptable to light, precision, multiple-bearing machines that have limited installation space. Its small size and simple installation overcomes cost limitations in most plants. Typical applications are: packaging, canning, labeling and textile machines . . . and machine tools. It is also suitable for tractor trailers, lift trucks and farm implements.

Accumite lubricates 24 points of spring winding machine. 1. Valves mounted directly on bearings. 2. Transparent lubricant reservoir. 3. Manually controlled air pump, actuated by "push-pull" valve.

ACCURATELY METERS THESE SHOTS OF OIL OR GREASE

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ALL THE ADVANTAGES OF "BUILT-IN" MEASURED LUBRICATION—PLUS MIDGET SIZE!

- Meters exact amounts of refinery-clean lubricants to all bearings whenever system is operated.
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- Prevents bearing troubles due to neglect or use of wrong lubricants.
- Services all bearings in one operation.
- Avoids work spoilage and bearing repairs due to over-lubrication.

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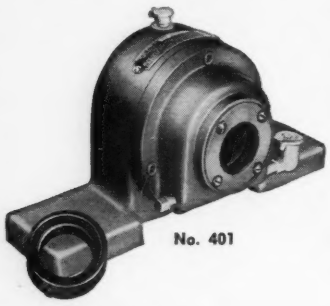
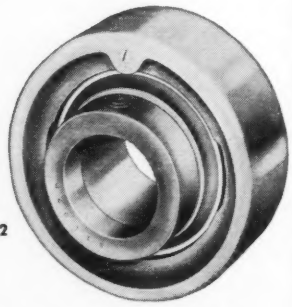
product news from—— United Steel
CORPORATION LIMITED



No. 401

Transmission Unit for High Temperature Locations

Specially designed for applications involving higher than usual temperatures, Fafnir SAL type (standard) and SAOL type (heavy series) ball bearing power transmission units, utilizing water-cooled end covers, have been successfully mounted in close proximity to ovens, fans, etc. which have had inside temperatures as high as 1,500°F. The amount of water used is small; the flow through a 5/16 in. copper tube generally being quite sufficient. The bearing lubricant is kept cool by this method, thus avoiding a breakdown of the oil even when the bearing housing is close to the exterior of the oven wall or fan housing.



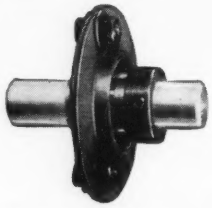
No. 402

Cylindrical Cartridges

Developed for ease of application, Fafnir Cylindrical Cartridges are convenient units for mounting in straight bored housings. All types incorporate a Wide Inner Bearing with Self-Locking collar and spherical outside diameter which is fitted to a corresponding spherical seat in the cartridge to provide self-alignment.

Low Cost, Self-Contained Ball Bearing Unit

Users can obtain the advantages of ball bearing performance at a new low cost with recently-introduced Fafnir Flangettes. The unit is comprised of two interchangeable pressed steel flanges which house a standard Fafnir Wide Inner Ring Ball Bearing with the exclusive Fafnir Self-Locking Collar, providing a complete, inexpensive housed unit for light duty, slow speed applications. They are compact, easy to mount, self-aligning, and pre-lubricated ready for installation. They are available equipped with either Plya-Seals (contact-type) or Mechani-Seals (slinger-type).



No. 403

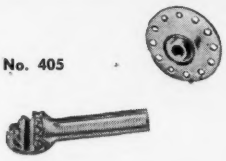
Ball Bearing Unit Features Current Conducting Rubber Cartridge

The Fafnir Type RCSM rubber cushioned ball bearing unit features the Fafnir Super-Quiet Ball Bearing plus a specially developed electric current-conducting rubber cartridge that eliminates need for grounding springs or clips. Available in an OD size range designed to make bearings readily interchangeable with sleeve bearings in popular spider-type brackets. Wide range of bore sizes.

No. 404

Aircraft Bearings Solve Many Commercial Bearing Problems

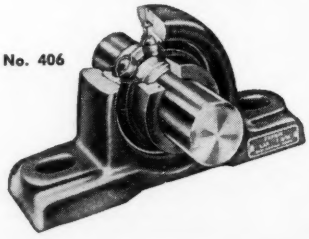
A series of ball bearings developed by Fafnir to meet the special and exacting requirements of the aircraft industry has found wide and rapidy broadening usage in many commercial applications where motion is reciprocating rather than rotational. Manufacturers of farm machinery, railway lighting equipment, lawn mowers, automatic machinery and other types of equipment have found the solution to a bearing problem in the Fafnir Aircraft Series.



No. 405

Pillow Block for Normal Load Applications

Recommended for all general industrial applications where normal loads are encountered, Fafnir LAK Type pillow blocks offer many positive advantages. Compact, one-piece housing can be mounted in any position. Fitted with deep-groove single row wide inner ring bearings which are designed to carry radial, thrust or combined loads, and frictionless, integral Mechani-Seals for effective retention of lubricant and exclusion of dirt. The unit is pre-lubricated ready for immediate installation.



No. 406

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THE CASTING VOTE

CSF Sales Engineers can help your plant benefit from steel castings.

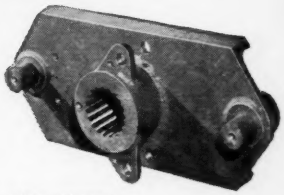
The blue-print stage is a very good time to get a "casting vote" — from your CSF Sales Engineer. He's a first-rate castings specialist, with cost-cutting facts at his fingertips.

Time and again, new products, new components are being made better and more economically by using STEEL CASTINGS. They're the big thing today. Existing designs are frequently improved by using CASTINGS to replace other methods.

By calling in the CSF Sales Engineer at the start, you'll make the best use of steel castings — and of the design-to-finished-product service that Canada's largest and most modern steel foundries offer you. Profit from his "casting vote" — this service is without cost to you.

HOW CASTINGS CUT YOUR COSTS
An actual case →

BEFORE...



AND AFTER...

This brake spider for power shovels was originally produced as a weldment. By redesigning it to a steel casting, **cost was reduced 34%, weight 20%.**

Other advantages of castings include: greater strength, better weight distribution, improved appearance.

CANADIAN STEEL FOUNDRIES LIMITED

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Member: A. V. Roe Canada Limited and The Hawker Siddeley Group

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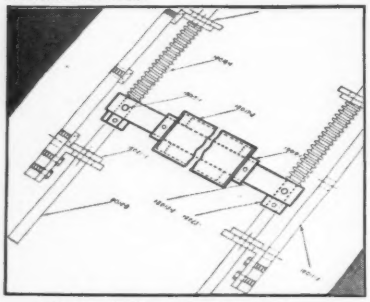
Ever Want Prints Emphasizing Parts of a Drawing?

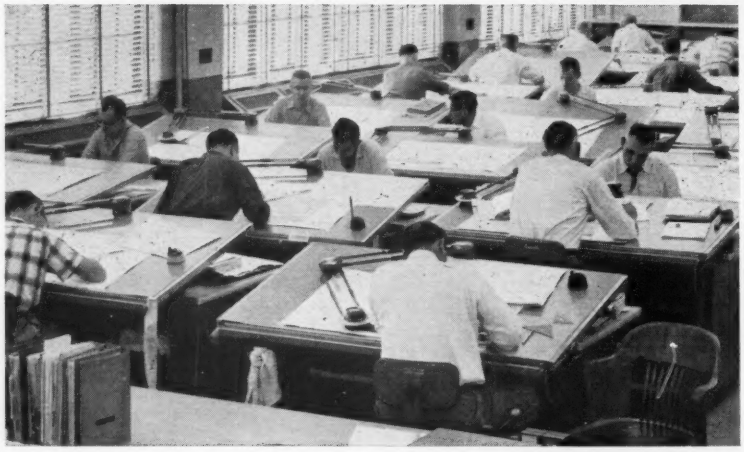
Engineers, architects and many other types of technical people often want prints that separate key parts of a drawing from the rest of it, and some weird and costly techniques have been used. This is understandable because the cost of *not* getting good separation or emphasis can also be shocking. Take the case of a large West Coast engineering organization constantly involved in plant construction. They used sepia prints of floor plans to lay out the electrical work. But the lack of contrast between the plumbing shown in the sepias and the electrical layouts added required hours of careful checking and frequent revisions, even caused some expensive construction errors.



Diazo print from special-blue image intermediate produces a sharp contrast between the parts to be emphasized and those to be subdued.

That's all ancient history now! Two of Dietzgen's numerous modern drafting-printmaking aids have turned this tough old chore into a picnic. They are new drafting media (one a polyester film and the other a vellum) diazo sensitized to produce a special blue image. The reproduction of your basic drawing on either of these media is bold and clear so drafting additions can be made without confusion or error. But when you make prints from the completed intermediate, the basic part in the special blue prints faintly (clearly visible but subdued) . . . while the added drafting, even in pencil, prints strong and bold. The results are perfect, easily and quickly obtained, delightfully inexpensive.

SOLVED: A COSTLY PROBLEM OF COMBINING DRAWINGS AND GRAPHS



Drafting time costing as much as $40 was used to draw a single grid . . . and draftsmen resented the tedious assignment.

A large manufacturer of automotive parts decided to plot their graphs directly on the drawings in order to end the nuisance of their being separated in handling, filing, plant interchange, etc. But this created many new problems. Tracing or drawing the grids in position proved costly, as much as $40 each in drafting time. They were rarely accurate and never uniform in character. The lines often smudged and usually reproduced poorly. The work created a morale problem because draftsmen resented the tedious assignment.

One of Dietzgen's modern drafting-printmaking aids furnished a perfect answer! It is a light-weight drafting film which is adhesive-backed and furnished printed with a stock grid. It is simply mounted in place and the grids are sharp, clean, clear and uniform, so much more accurate that fewer plotting points are needed to develop the graphs. Reproductions were so noticeably better as prints moved through other departments and associated plants that the change was investigated and quickly adopted. Much needed drafting time and capacity is saved and the reduction in costs amounts to many thousands of dollars a year.

Drafting-Printmaking Handbook reports new techniques for solving engineering and production problems

This new 36 page handbook describes a wide variety of engineering and production problems that have been solved with advance techniques in drafting and printmaking pioneered by Dietzgen. The concise, problem-solution approach suggests ways in which you may improve the efficiency within your engineering department or eliminate production bottlenecks. Write today on your company letterhead for the Mechanics of Modern Miracles. Ask for Publication SPD2-A10. Eugene Dietzgen Co., Chicago 14, Illinois.

DIETZGEN

EVERYTHING FOR DRAFTING SURVEYING & PRINTMAKING

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Measuring up a multi-ton mix with MAXAM-NOPAK pneumatic equipment

The big Concrete Batching Plant manufactured by Construction Machinery Company, Waterloo, Ontario—and its compact MAXAM-NOPAK pneumatic control panel.

These controls set the ponderous machinery of Construction Machinery Company's Concrete Batching Plants into operation—weighing, measuring and mixing huge quantities of sand, gravel, cement and water with complete precision.

Guiding the big gates that must snap shut against tons of aggregate or inch open to release a few predetermined ounces demands an accurate and dependable control system. Construction Machinery Company found the answer in air power—by MAXAM-NOPAK!

Through exhaustive tests, C.M.C. proved the superiority of MAXAM-NOPAK pneumatic systems for Batching Plant control. Special equipment to meet their specific needs was designed and installed with the help of Holman's technical staff—the same group of pneumatic control engineers who can be called upon for fast efficient service on all MAXAM-NOPAK systems.

For full information on MAXAM-NOPAK pneumatic equipment—and for design assistance by pneumatic engineering specialists—write:

MAXAM

MAXAM-NOPAK DIVISION

HOLMAN BROS. (CANADA) LTD.

97 KENT AVENUE, KITCHENER, ONTARIO

For sales and service on MAXAM or NOPAK, contact: Suite 3, 1415 Lawrence Ave. W., Toronto or 8025 Decarie Blvd., Montreal

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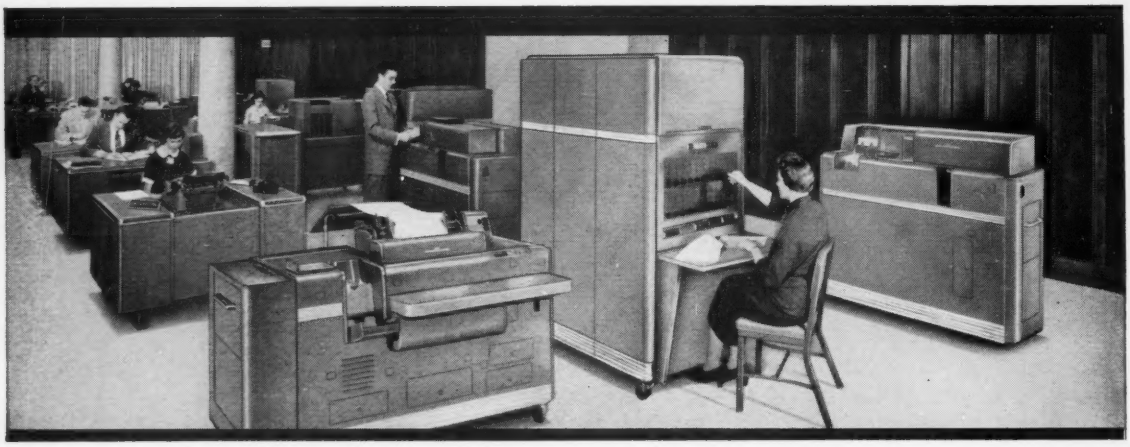

...but pay only for the time you use it.

Companies, institutions, governments . . . anyone with accounting or statistical work to be done, can use IBM Data Processing Machines, (including the IBM 650, 704 and 705 Electronic Data Processing Machines) at the IBM Service Bureau *on an hourly or job basis, paying only for the work they want done.*

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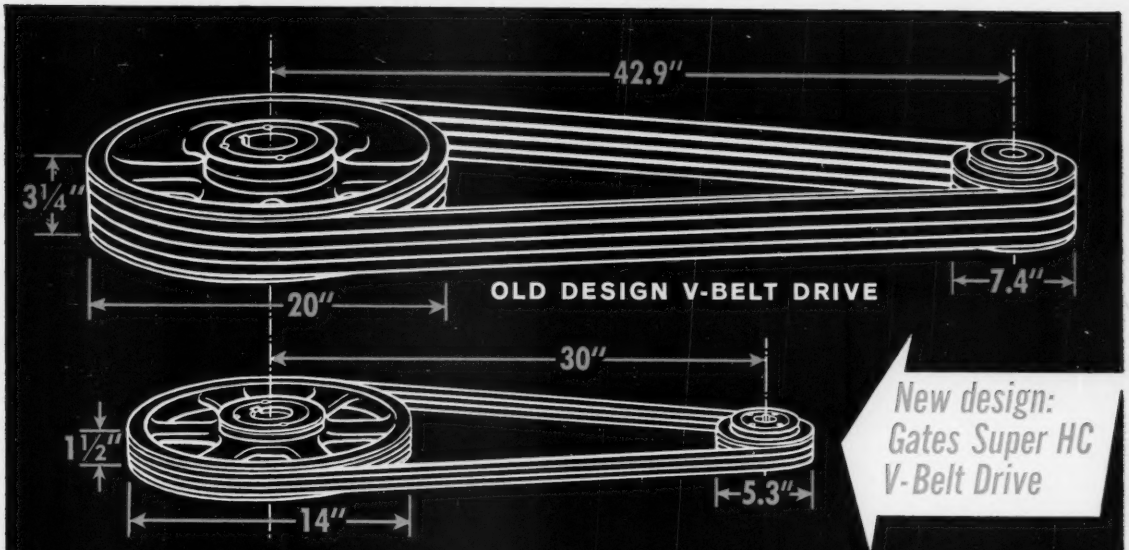
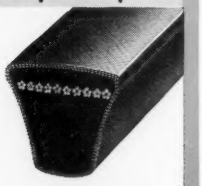
Same horsepower... for same machine... ***new compact drive***



New high capacity Gates V-Belt saves up to 50% in drive space!

Space savings provided by a typical installation:

	DriveR Sheave Diam.	DriveN Sheave Diam.	Center Distance	No. of Belts
Present Drive	**7.4"**	**20.0"**	**42.9"**	**4**
Super HC Drive	**5.3"**	**14.0"**	**30.0"**	**3**



Exclusive design features include:

precisely engineered arched top, concave sidewalls, Flex-Weave cover, super strength tensile construction.

Cuts drive costs as much as 20%

The Gates Super HC V-Belt is a completely new concept in V-belt design . . . fully proved by over 5 years of extensive field testing . . . a product of Gates *Specialized* Research.

Because of the exclusive design features of the Gates Super HC V-Belt, it transmits up to 3 times the horsepower of standard V-belts in the same space. As a result, sheave diameters and sheave widths can be reduced as much as 50%, and center distances can be reduced 20% and more.

Moreover, with the Gates Super HC V-Belt drive, your cost is up to 20% less than for other V-belt drives of the same horsepower capacity.

All this means that by using the Gates Super HC V-Belt, you can have the lowest cost, most compact, lightest-weight multiple V-belt drive you can put on any machine.

World's Largest Maker of V-Belts

Gates Rubber of Canada Ltd.
Brantford, Ontario

X-937E

Gates Super HC V-Belt Drives

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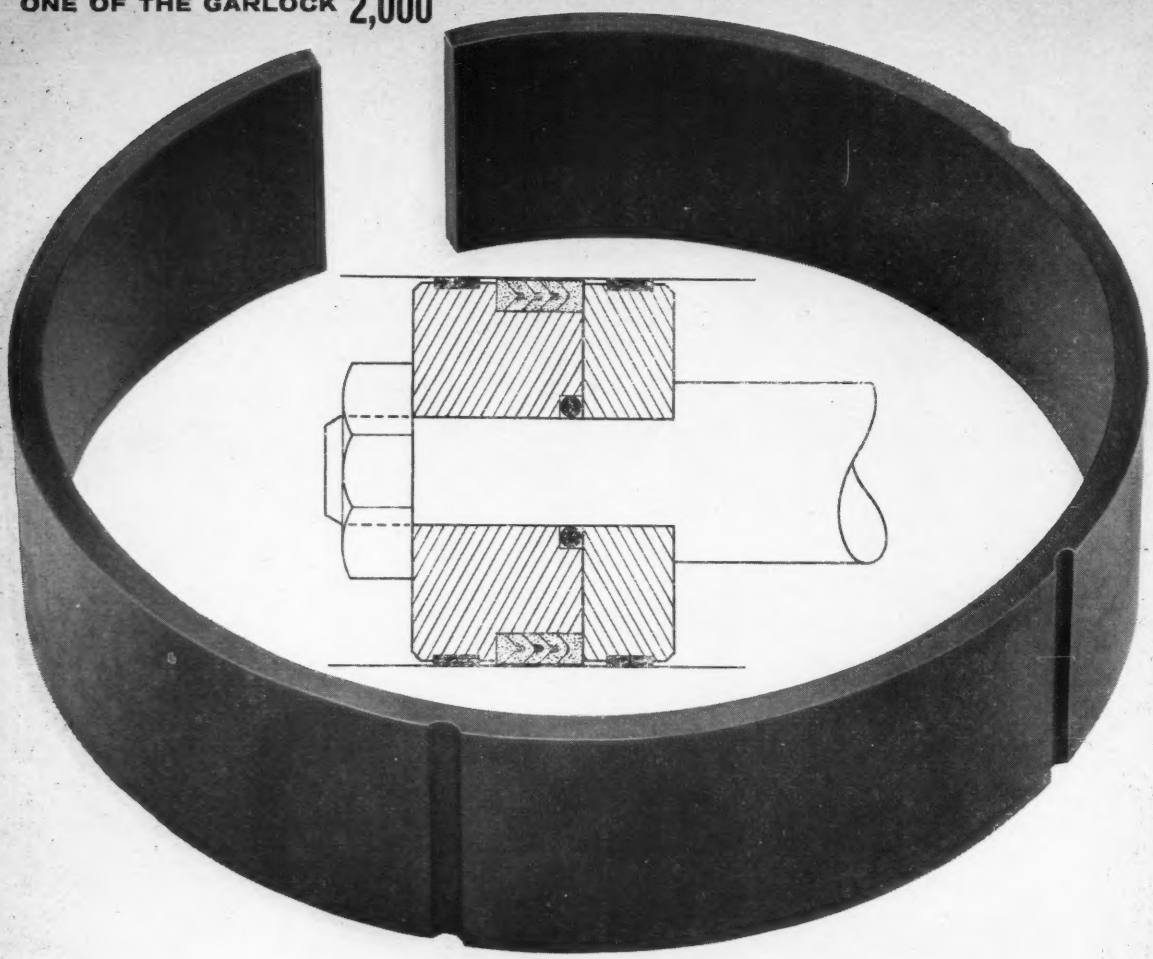
ONE OF THE GARLOCK **2,000**



NOW...PREVENT DAMAGE TO PISTON CYLINDERS WITH NEW GARLOCK NYLON WEAR RINGS

COMPARE THE FINE ADVANTAGES OF NYLON WITH OTHER WEAR RING MATERIALS:

- Higher Temperature Resistance (350°F)
- Greatly Extended Life
- Much Better Wear Qualities

Garlock Nylon Wear Rings are harder, smoother... will not pick up foreign particles in the cylinder ... have no imbedded materials that can score cylinder walls. For you it adds up to smooth, unhampered piston operation, greater overall efficiency, and longer cylinder life.

Specify Garlock Nylon Wear Rings. They're available in many sizes for new equipment, and will fit existing grooves in present equipment. Talk it over with your local Garlock representative. He can choose from "the Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals for every need. Or, write

THE GARLOCK PACKING COMPANY OF CANADA LTD.

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GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

Canadian Division: The Garlock Packing Co. of Canada Ltd.

Plastics Division: United States Gasket Company

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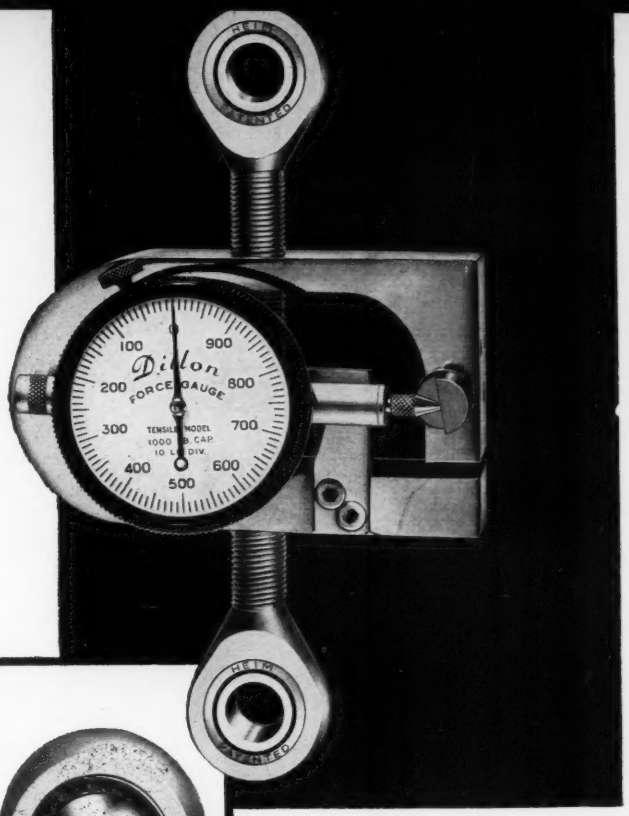
This Success is No Secret...

The Dillon Mechanical Force Gauge is used for precision measurement of pressure, tensile or torque. For ease in applying load to tensile models, Unibal rod end bearings are attached to each leg of the alloy steel bar. If an oscillating, push-pull motion must be measured, both the compressive load and the tensile load are applied through Unibal rod ends.



Heim Unibal Male Rod End

In this case, an instrument calibrated 180 degrees in compression (reading clockwise), and 180 degrees in tensile (reading counterclockwise) is required.

Here is a true success story of a device, built with watchmaker's precision, which is designed to check all such loads, even in limited space.

It is no secret that the

HEIM *Unibal*® SPHERICAL BEARING ROD END

contributes to the successful operation of the Dillon Force Gauge. Two Unibal male-threaded rod ends are attached to the pressure bar. Calibration in both tensile and compression is conducted against a pin placed through the Unibal, or eye, of the rod end.

Heim Unibal corrects misalignment in every direction, reduces friction, carries maximum loads, saves time and money in assembly.

All Heim bearings are available through the leading bearing distributors in the U. S. and Canada. Send for complete catalog with distributors' names and locations.

R&M BEARINGS CANADA LTD.

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as versatile as your imagination...

STAN STEEL TUBING

New advancements—new improvements in your products are limited only by the boundaries of creative imagination. You'll find that versatile welded steel tubing, fabricated for you by Standard Tube, can solve your design problems.

Let us help you with imaginative design planning for your products.

Aluminum Sheet, Bar, Extrusions, Tube and Wire also available in any quantity.

STANDARD TUBE AND T.I. LIMITED

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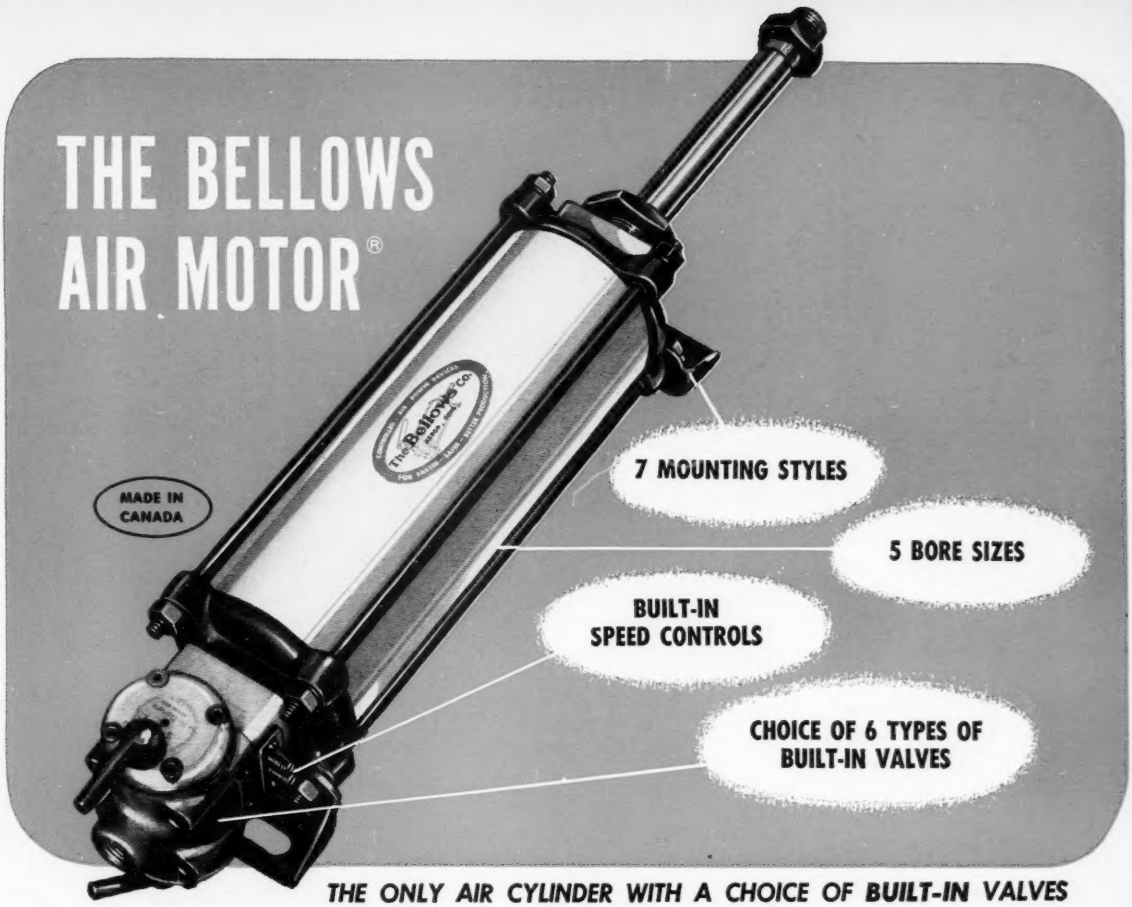
THE BELLOWS AIR MOTOR®



THE ONLY AIR CYLINDER WITH A CHOICE OF BUILT-IN VALVES

In designing for air operation, the engineer can choose the method of valving he prefers—and still have all the advantages of integral valve and cylinder construction.

Six different built-in valve arrangements give the engineer every latitude in pneumatic design.

If he prefers to use 8-12 volt electrical control with its simplified wiring, Bellows has it. If he prefers to use 115 volt control and JIC standards, Bellows has it. If he requires low or high voltage explosion-proof control, Bellows has it. Should his design require full pneumatic control, Bellows has it. Or should he wish to control his pneumatic circuits manually or through mechanical linkage or cams, Bellows has it.

Unlike conventional air cylinders which require separate remote directional and speed control valves and dual piping, the Bellows Air Motor is a complete power unit with directional valve and dual speed control valves built-in as an integral part of the unit. Only one air connection, which can be made with flexible hose, is required.

Integral valve and cylinder construction means quick response, more positive response, more precise control and more economical operation.

The Bellows Air Motor is made in five bore sizes: 1¼", 1¾", 2½", 3⅝", and 4½", and in any stroke length.

***WRITE FOR THIS BULLETIN* TODAY!**

627C-1

Four-color, 20-page bulletin describes the complete line of Bellows Air Motors. Free on request. Address Dept. DE-260, Bellows-Valvair, Ltd., Toronto 18, Ontario.

Bellows-Valvair, Ltd.
TORONTO 18, CANADA

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STRIPPIT SUPER 30 FABRICATOR

Larger work sizes for more efficiency...for short run punching — 30″ x any length ... for production run hole duplication — 25″ x 30″.

Adjustable table for greater accuracy and flexibility...for punching to closer tolerances in angles, shapes and formed parts as well as flat sheets.

New, no-jam electric head eliminates down time...and the need for pressurized air. Fewer parts minimize maintenance — ensure quieter, more positive operation.

Wide range of hole punching capacities...from a 3½″ hole (round or shaped) in 16 gauge to a ½″ hole in ¼″ mild steel.

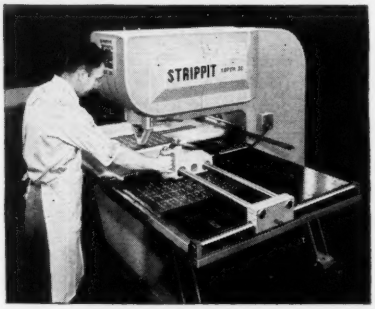
Corner and edge notching...up to 5″ x 5″ in 16 gauge mild steel — 90° corners, rectangular, vee, radii and special shape edge notches.

Straight line nibbling and contour shearing...at 165-strokes per minute in ⅛″ mild steel. Instant changeover from single stroke punching.

New swing-shift punch holders...quick-opening, positive-closing — for right or left-hand operation. Electrical interlock for safety.

Exclusive quick-change tooling system...using standard stock punch and stripping guide assemblies and die buttons. Size changes take less than 20 seconds.

New quick-set gauging system...with micrometer settings for fast, accurate layout and rapid work positioning.



EASY CONVERSION TO A PRODUCTION PUNCHING UNIT...

with the Strippit Duplicator which can be built-in as an integral part of the Super 30 Fabricator — and the Dupl-O-Scope for punching Duplicator templates from a drawing, layout or sample part.

WRITE TODAY... for complete details, illustrated literature, price and delivery.

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STRIPPIT
TOOL & MACHINE COMPANY
A Division of Provincial Engineering Ltd.

A UNIT OF HOUDAILLE INDUSTRIES, INC.

103 Hansen Road • • Brampton, Ontario

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THIS IS CRONAFLEX® DRAFTING FILM (.004") THICKNESS

WRITE ON IT · ERASE IT · TRACE THE DRAWING
TEST TRANSPARENCY · NOTE GLARE RESISTANCE · TEAR IT—IF YOU CAN!

THIS IS ONE COUPON YOU CAN'T TEAR OUT.
BETTER USE SCISSORS OR A KNIFE.

CRONAFLEX Drafting Film is a product of the Photo Products Department, E. I. du Pont de Nemours & Co. (Inc.) Wilmington 98, Delaware.

Printed in U. S. A.

Du Pont of Canada Limited
Photo Products Department
85 Eglinton Avenue, East Toronto 12, Canada

Please send me additional information about CRONAFLEX Drafting Film and a list of suppliers in my vicinity.

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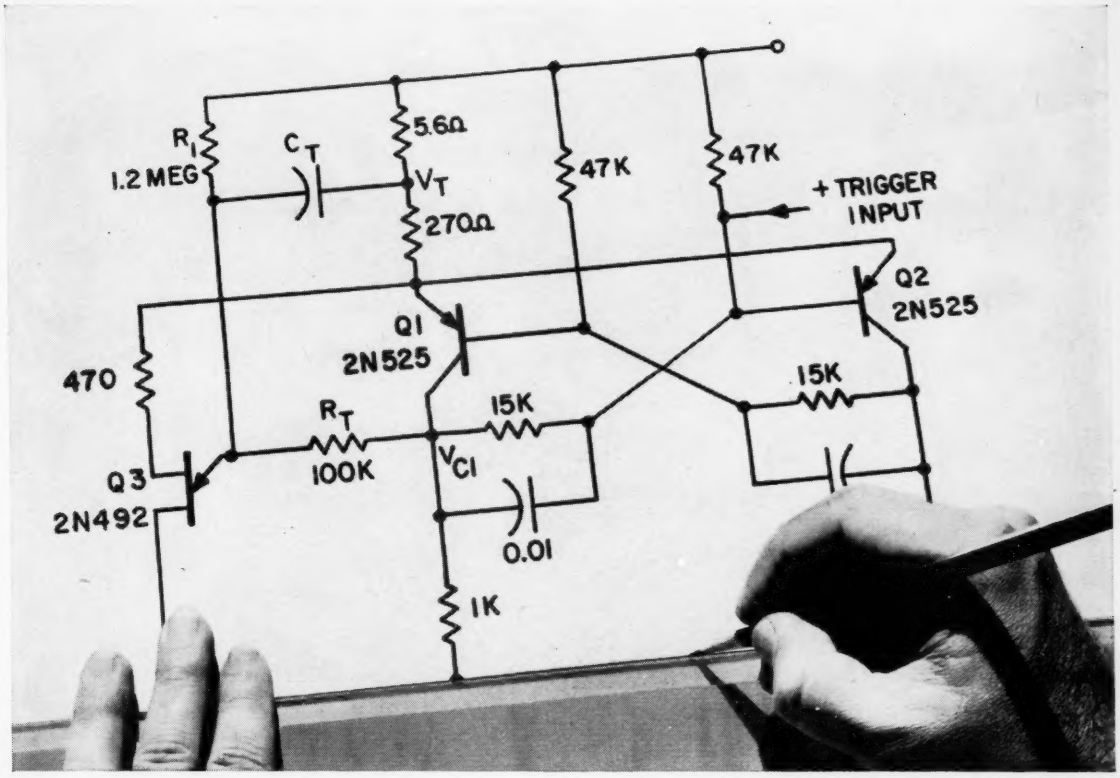
Title_____

Company_____

Street_____

City_____ Zone_____ Province_____



NEW! **CRONAFLEX** Drafting Film offers best surface every time you use it

CRONAFLEX* is the only drafting film made entirely by Du Pont. It is an exclusive combination of a superior surface on Du Pont's unique CRONAR* polyester film base. Du Pont makes the surface and the base in one complete process that assures you of consistent quality. Every piece of CRONAFLEX Drafting Film has been subjected to the most careful supervision during its entire manufacturing cycle. The .004" thickness of this new drafting film makes it easy to handle and to file.

The surface: ideal for pencil . . . erases easily . . . smear-resistant . . . clearer than cloth—you get faster print-through speed with greater uniformity . . . accepts ink.

The base: holds size . . . flexible . . . unexcelled strength . . . moisture-resistant . . . easy to handle . . . lies flat.

CRONAFLEX Drafting Film is available *now* in many put-ups and sizes . . . in either roll or sheet form . . . matted one or two sides.

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. . . *through Chemistry*

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(SAE) CARBON HYDRAULIC QUALITY TUBING

from Superior Tube

Sold and Stocked exclusively by LYMAN

Eliminate Line Failures... save money... Get Fast delivery — *specify* SUPERIOR (SAE) HYDRAULIC TUBING

Lyman complete warehouse stocks of sizes from ⅛" to 1⅛" OD with walls ranging from .020" to .125" enable us to make quick delivery as Superior's exclusive Canadian distributor.

Avoid unnecessary line failures and down-time by installing Hydraulic Tubing with the "quality Safeguards."

- Use of 0.12% Maximum carbon content material for ease in hand bending and flaring.
- Use of non-aging steel to prevent loss of ductility during storage and from service fatigue.
- Controlled atmosphere annealing for **bright** scale-free outside and inside diameter.
- Mandrel-drawn close to finish size for smooth inside diameter.
- Flare inspected on basis of 35% minimum increase on outside diameter.
- 100% hydrostatic pressure testing to recommend maximum working pressures.
- All tubing dipped and drained in light, filtered rust preventive.

Ask your LYMAN representative for complete details and a copy of Bulletin 39.

LYMAN TUBE AND BEARINGS, LIMITED

MONTREAL TORONTO HAMILTON LONDON WINNIPEG
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NOW-Your Product, too, can have the extra values of BONDERITE for Aluminum!

SPECIFY BONDERIZED AND PAINTED ALUMINUM STRIP

Get the jump on your competitors by offering the well-known extra values of Bonderite for aluminum on your products.

If your production justifies it, install a Bonderite line; if you don't want to make the investment right now, specify BONDERIZED and painted stock from your supplier.

Bonderite on aluminum adds tremendously to the appearance and performance life of the paint finish. Paint is anchored so securely that stamped and roll formed products may be fabricated without chipping or peeling of the paint film or any loss of adhesion, even after most severe deformation.

To meet and beat competition, equip your products with recognized Bonderite sales appeals:

1. Longer-lasting fine appearance.
2. Positive corrosion control.
3. Increased paint durability.

More than 200 plants, of all sizes, are using Bonderite for aluminum today. Investigate for *your* plant now!

Bonderite for aluminum meets and exceeds the requirements of Government Specification MIL-C-5541.

Since 1914— leader in the field

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REXDALE BLVD., REXDALE (TORONTO), ONTARIO

BONDERITE corrosion resistant paint base | BONDERITE and BONDERLUBE aids in cold forming of metals | PARCO COMPOUND rust resistant | PARCO LUBRITE—wear resistant for friction surfaces | TROPICAL—heavy duty maintenance paints since 1883

Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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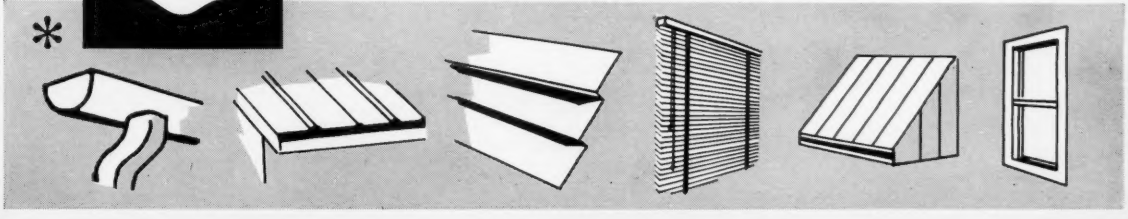

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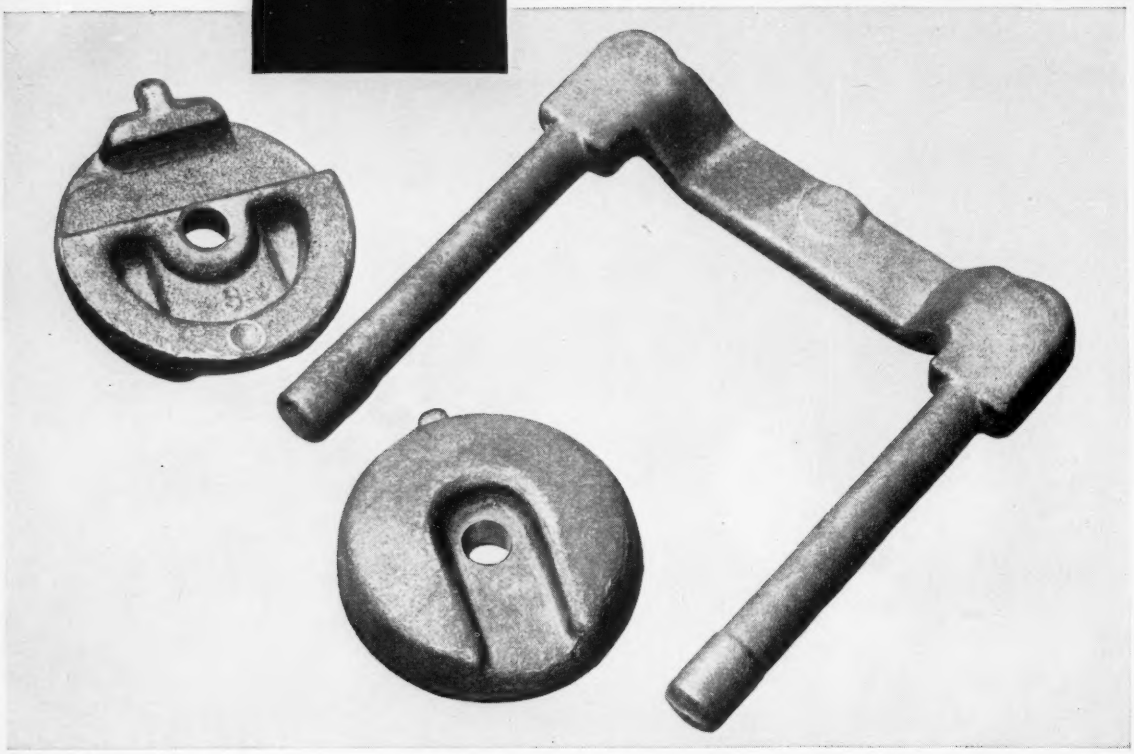
STELCO

DROP FORGINGS

information

Send your request for regular mailings of the Stelco bulletin "Drop Forgings Information."



Precision Components for Consumer Products

DROP FORGED by STELCO

Please quote reference No. 759 when enquiring.

The U-bolt and cams shown here are drop forged by Stelco for assembly into domestic washing machines, produced by a well known Eastern Ontario washing machine manufacturer.

The close tolerances achieved in Stelco Drop Forgings reduce to a minimum any finishing required on such parts. Properly designed dies permit pieces to be shaped with unbroken grain flow lines, ensuring maximum strength characteristics. At the same time the impact of the forging process increases the density and toughness of the metal. Stelco forged parts are economical, precisely formed, and provide exceptionally high strength to weight ratios.

Stelco's Engineers would be glad to discuss with you the application of forgings to your operations. Contact Stelco at Gananoque, or at any Sales Office.

BUY CANADIAN

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THE STEEL COMPANY OF CANADA, LIMITED

Drop Forge Division, Gananoque, Ontario

Sales Offices: Halifax, Saint John, Montreal, Ottawa, Toronto, Hamilton, London, Windsor, Winnipeg, Edmonton, Calgary, Vancouver. J. C. Pratt & Co. Limited, St. John's, Newfoundland

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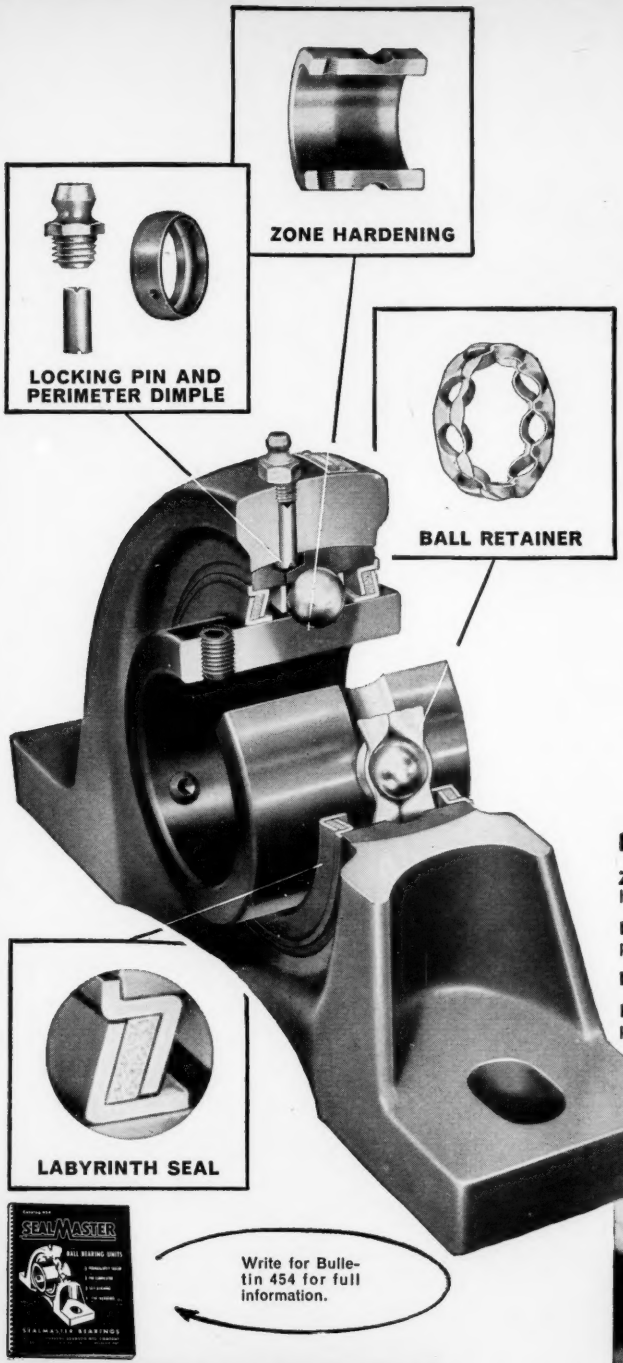


THIS EXCLUSIVE COMBINATION OF FEATURES IS YOURS WITH SEALMASTER BALL BEARING UNITS ... PLUS QUICK, EASY MOUNTING!

Slip a SEALMASTER Ball Bearing Unit into place on the shaft—tighten two set screws and you have the answer to ease of mounting in a bearing unit. SEALMASTER'S exclusive combination of features take over from there, providing smooth, trouble-free performance and long bearing life.

FEATURES:

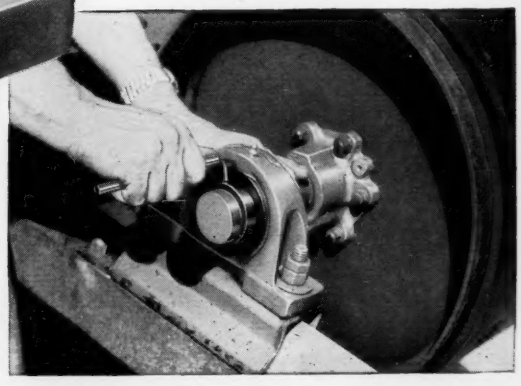
ZONE HARDENING . . . assures positive race-to-shaft holding power.

LAND RIDDEN BALL RETAINER . . . traps grease and prevents "churning."

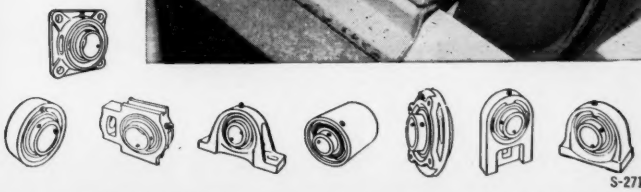
LABYRINTH SEAL . . . keeps dust and dirt out, lubricant in.

LOCKING PIN & PERIMETER DIMPLE . . . assures positive lubrication.

Write for Bulletin 454 for full information.



SEALMASTER BALL BEARING UNITS



S-271-C

SEALMASTER BEARINGS A DIVISION OF STEPHENS-ADAMSON MFG. CO. OF CANADA LTD., BELLEVILLE, ONTARIO

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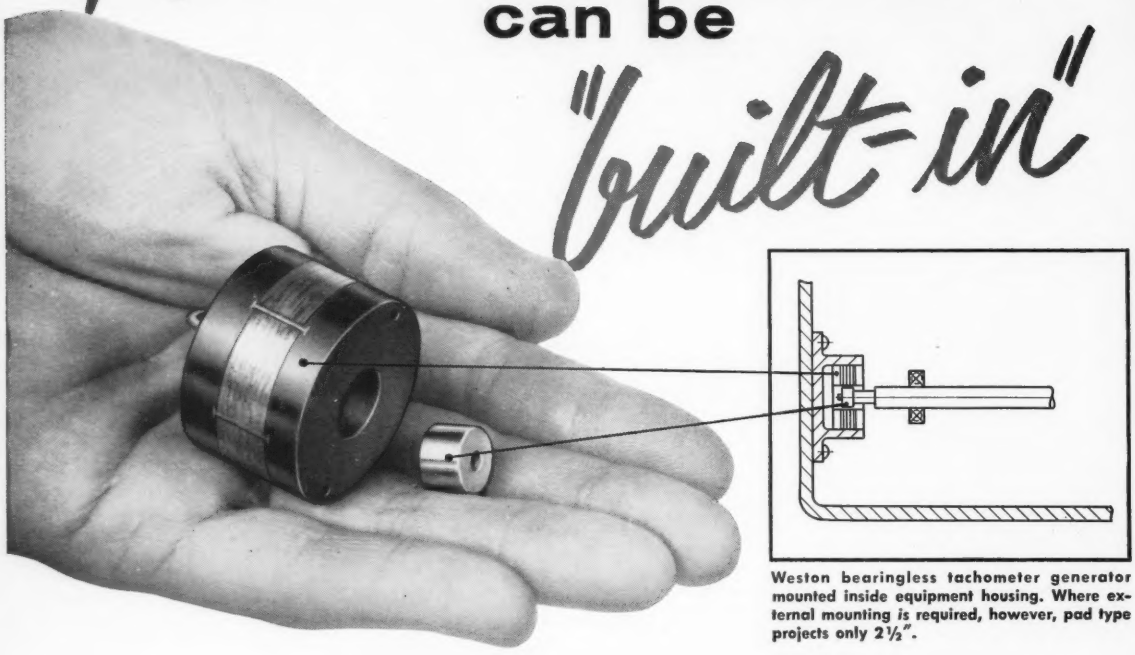
Now... The TACHOMETER GENERATOR can be "built-in"



Weston bearingless tachometer generator mounted inside equipment housing. Where external mounting *is* required, however, pad type projects only 2½".

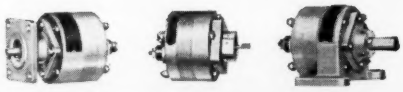
WESTON Bearingless Tachometers save Space...Weight...Cost!

With the Weston bearingless design, the tachometer generator can now be built-in, rather than attached to, rotary equipment. But where external mounting is essential the special pad housing projects only 2½". Either way, it means big **weight saving** and **space saving;** and lends itself to better overall design. Best of all, the compact rotor and stator are oil-resistant and virtually trouble-free . . . and initial costs are now 'way down.

Can be used with individual or duplicate and remote indicators, and with Weston recorders. Speed ranges, low as 500 and up to 80,000 rpm full scale. For the complete Weston Tachometer story, send for catalogue to-day. **Daystrom Limited, 840 Caledonia Road, Toronto, Ontario, 5430 Ferrier Street, Montreal, Que. A subsidiary of Daystrom, Incorporated, or any office of Northern Electric Co., Ltd.**

5715

Weston Indicators are available in required sizes and shapes, calibrated in any function of RPM.



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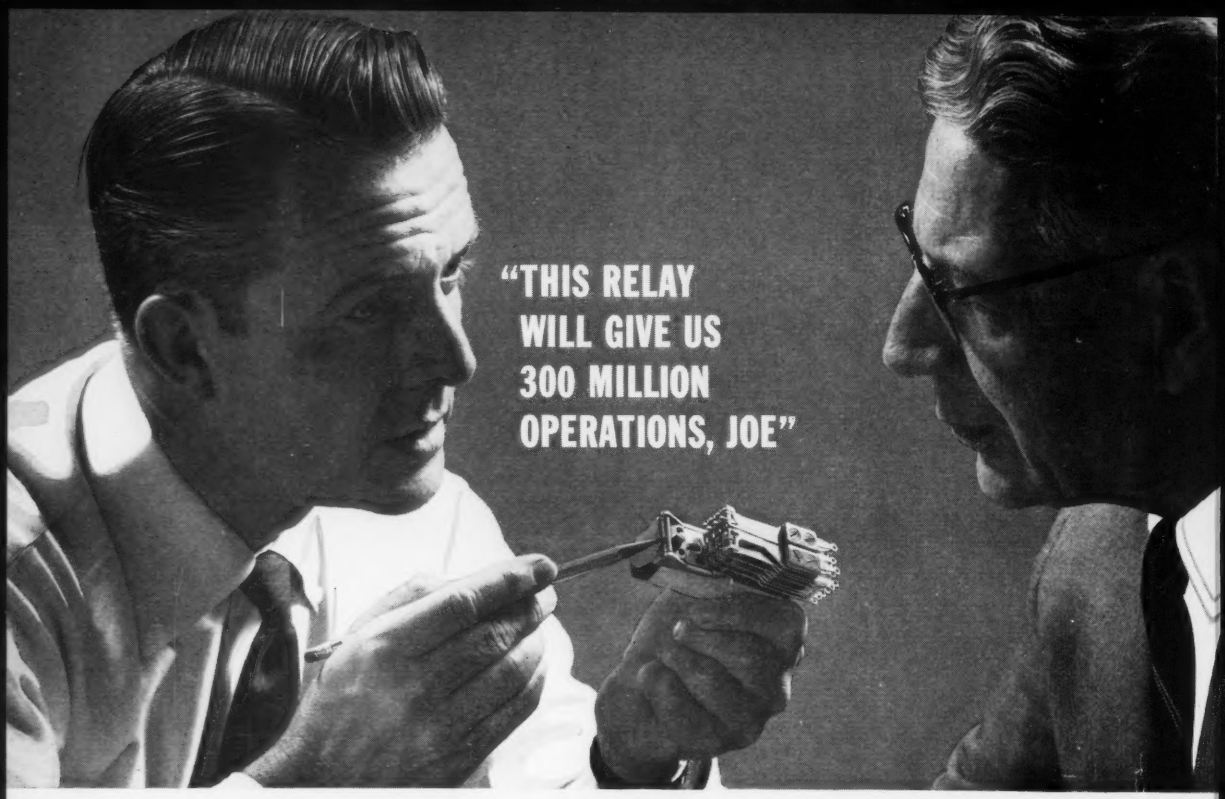

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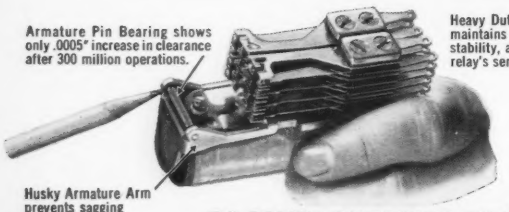

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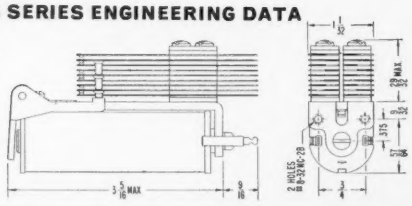
BS SERIES ENGINEERING DATA



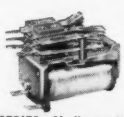
GENERAL:
Breakdown Voltage: 1000 volts rms 60 cy. min. between all elements.
Ambient Temperature: −55° to +85° C. +125° C available on special order.
Weight: 9 to 16 ozs.
Terminals: Pierced solder lugs; Coil: One #16 AWG wire Contacts: Two #18 AWG wires
Enclosures: Dust covered or sealed

CONTACTS:
Arrangements: DC—up to 28 springs AC—up to 24 springs
Material: ¼" dia. twin palladium. Up to ½" dia. single silver. Other materials on special order.
Load: 4 amps at 115 volts, 60 cycle resistive
Pressure: 15 grams minimum

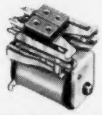
COILS:
Resistance: 100,000 ohms maximum
Current: 10 amps maximum
Power: DC—50 Milliwatts per movable arm. Greater sensitivity on special order. AC—17.9 volt-amps.
Duty: Continuous
Treatment: Centrifugal impregnation
Voltages: DC—up to 300 volts with series resistor. AC—up to 250 volts, 60 cy.

MOUNTING: Two #8-32 tapped holes ¾" o.c. Other mountings on special order.

GS SERIES—Excellent sensitivity: 50 mw per movable arm minimum (DC). For applications requiring many switching elements in small space.



LS SERIES—Medium coil relay with short springs and light weight armature for fast action, reliability and long life.



TS SERIES—Short coil relay is available in AC and DC versions. Long life construction. Can be supplied (DC) with up to 20 springs (10 per stack).

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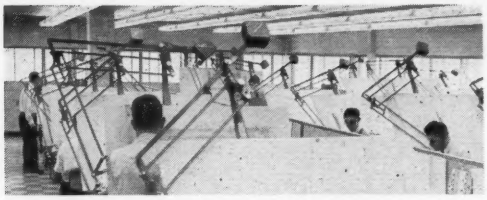


planned space utilization and functional equipment pay off

Design Engineering looks . . .
. . . at the design and drawing office

In the growing complexity of modern business, the man who sits, or more usually stands, at the drafting desk becomes increasingly important. So, too, do his surroundings, the atmosphere where he works, and the equipment he works with. Not all managements realize this.

Your editor was recently the guest of an executive in a large manufacturing firm not too many miles from our downtown office in Toronto. The furnishings in this executive's office were, of course, in fitting with his stature as a business manager.

The secretary's office, too, was quite adequately equipped. She sat on the very latest design of posturepedic chair; an intercom unit connected her office with her boss's. She typed on a super-deluxe model electric machine and used an automatic calculator (about once a week, she confided). The office was lined with modern filing cabinets, and indeed, it appeared that every possible consideration had been given to providing the best of working conditions for this secretary.

The accounting department, too, had done a good job of selling the boss on their requirements. Full machine accounting had been installed. Expensive data processing equipment had revolutionized their office procedures, the manager proudly explained.

Then we went to the engineering and design office. What a contrast! Engineer-designers were using 25-year-old manual type adding machines; draftsmen were hunched over horizontal boards; the lighting could not have been much better than that on the Queen Elizabeth Way; drawings and prints were stored in stacks on open shelves—we could go on, but we are certain by now that you have the picture.

How this businessman expected to get creative designs and effective engineering from such an ill-equipped department is way beyond our imagination. We remember, too, that every product manufactured in his plant, every cent of income that his firm earns, is born in these surroundings.

When one considers the high cost of creating and recording an engineering design (some run into the millions) and then balances against that cost the low investment required to equip the drafting and design office with the very best of facilities—there can be no plausible excuse for failing to take advantage of all the benefits to be derived from such an investment.

Besides, design engineers and draftsmen are among the most highly trained workers in industry. The Canadian economy would fall flat on its face without their creations. Protecting their health and eyesight, facilitating their imaginative capabilities, adequately rewarding them for their labors, and just generally making it as easy as possible for them to perform their daily tasks, is a readily recognized method of cutting costs, improving production and increasing profits.

Not all engineering offices in Canada are as poorly equipped as the example we have just cited. We feel quite certain, though, that there is not a single office in the country which could not be found wanting in one respect or another.

With this thought in mind we have invited some of the experts to present their facts and findings for our guidance. The next 15 pages tell their story. ★

Illustrations above show the old and the new in design office of Mathews Conveyor Co., Port Hope, Ont. It is now rated one of the finest design offices in Canada.

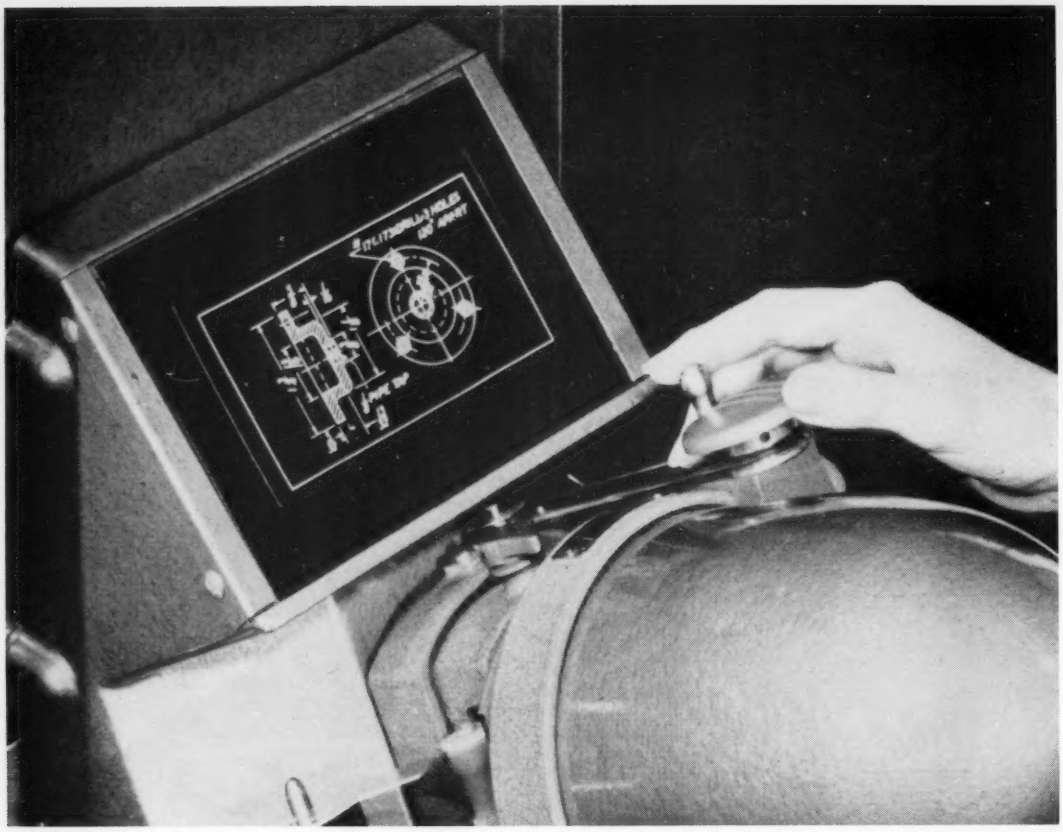


Fig 1. Electrostatic microfilm enlarger-printer enlarges up to 16 times; can print material as big as 18x24 in.

Cost-cutting with automated microfilm

One manufacturer saved 99% on storage space, plus equipment economies

Russell M. Shepherd

Exclusive DE Feature

Through the use of integrated microfilm systems, industrial firms throughout Canada are cutting their filing and storage costs and reducing the time required to get engineering drawings into the hands of the personnel who need them. New microfilming techniques and equipment used by these organizations are supplanting other, more cumbersome reproduction methods.

South of the border, industry and government leaders have established microfilming as a leading reproduction technique. The United States government, for instance, now requires that all engineering drawings prepared to implement government contracts be put on microfilm for government files.

The distinctive advantages of microfilming show up most clearly when the process is contrasted with conventional methods of handling and reproducing engineering drawings.

Mr. Shepherd is vice-president and managing director of Charles Bruning Company (Canada) Ltd., Toronto, Ont.

Conventional Method

Basically, the conventional method is a manual operation. The first step is location of the drawing. A file clerk must go to a vault, leaf through a number of large, often tightly packed, drawings to find the desired item, and then pull the drawing by hand.

Next, the drawing must be reproduced manually on a diazotype or blueprint machine. Although diazotype copying is rapid and economical, it is used to greatest advantage for same-size copying. But when it is necessary to make a copy smaller than the original, microfilming is preferable. It is particularly useful in reducing large engineering drawings to manageable size.

Of course, microfilming as a technique is well known. Easy-to-operate microfilm cameras have been in general use for some time.

Automated microfilm systems

Integration of the camera with aperture cards and electrostatic enlarger-printers has led to the develop-

ment of a new concept — automated microfilm systems. Conversion to such a system begins with making 35 mm microfilm of all original engineering drawings.

Next, the microfilm reels are cut up into individual frames and mounted on aperture cards. These cards can be tabulating cards, marginal punched cards, or standard filing cards. Each card is designed to hold one or more microfilm frames. (See fig. 4). The film can be mounted by the using organizations or by service companies. Simple manual devices are available for cutting and mounting frames from reels to aperture cards.

Aperture cards are designed to provide spaces for identification of the microfilmed drawing by number, size, and other pertinent information, either in the form of written or typed notations, or key punches.

Once mounted (or *unitized,* as this process is called in the trade) the microfilm can be filed according to whatever system is established, and selected manually, automatically, or by marginal punched filing methods.

Use of microfilm aperture cards in place of original full-size drawings results in a dramatic reduction of storage space requirements. For example, up to 70,000 tracings on microfilm aperture cards can be stored in a small filing cabinet.

In addition, the problems posed by filing drawings of different sizes are eliminated. Since all aperture cards are the same size, it is possible to file all the cards in numerical sequence. This is more rapid than the common present method, in which original drawings are first divided into groups of different sizes, and then filed numerically.

When these original drawings are requisitioned by the user, a file clerk must search several files in order to accumulate all the drawings that belong to a particular group.

By rule of thumb, this increase in filing efficiency, brought about by using a microfilm system, makes it possible to release up to 90% of filing personnel for other duties and responsibilities. The work of ten girls pulling prints in the conventional system can be accomplished by a single girl and a microfilm card file system.

Reading the film is easy

Microfilm drawings can be made available to users in two ways. If only one drawing is to be used at a time, and that drawing is to be viewed only (not marked or altered), a microfilm viewer is valuable. Some of the new viewers act as slide projectors and can project an image as large as 3 feet by 4 feet.

If a number of drawings are required for simultaneous use (or a drawing is to be marked), enlarged black-on-white paper copies of the microfilm can be made on an electrostatic microfilm enlarger-printer. Machines of this type have been designed specifically for handling aperture cards. These units magnify the image on the microfilm from 14 to 16 times.

The resulting enlargement is a copy large enough to read without difficulty and yet small enough to handle easily. One well-known enlarger-printer produces sharp permanent copies on standard size sheets (size ranges from 8½ x 11 to 18 x 24). During a continuous copying operation, exposure of the print takes only a few seconds, and a finished print is delivered a half minute after exposure.

Like the microfilm camera, electrostatic microfilm enlarger-printers can be operated by personnel without special training. An operator simply inserts a card-mounted (or roll) microfilm and the appropriate paper. The machine does the rest.

Fig 2. This is the photograph from which detail in Fig. 1 was extracted. The machine is commercial type.

Fig 3. Planetary camera converts into a microfilm enlarger in less than one minute by using enlarger head.

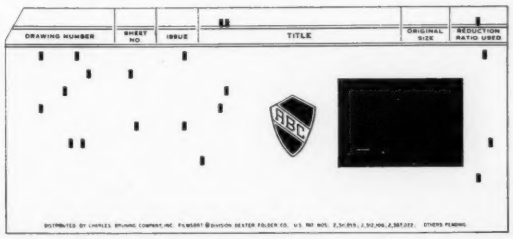


Fig 4. Microfilm reels are cut up into individual frames and mounted on aperture cards (tabulating, filing).

continued ▶

Prints made on these machines have a fine surface that can be written, drawn, or typed on like regular paper, permitting the entry of notations, additions, and revisions.

Another successful method of making enlarged copies of microfilmed drawing is provided through the use of an enlarger adaptation on a planetary camera. By interchanging the camera head and the enlarging head, copies ranging from 6 to 30 magnifications in size can be made on any projection medium. The use of projection vellum, projection tracing cloth, or projection film produces a transparent master from which any number of prints can be made on a diazotype reproduction machine.

Other advantages

In addition to easy economical handling, microfilming provides a number of special advantages to users. A major automobile manufacturer in the United States was able to store over 18 million aperture cards in a 20 ft. x 30 ft. area. This represented a 99% space saving over storage of original prints. Apart from the substantial floor-space economies, major savings were made on filing equipment. Since drawings were concentrated in a small area, all prints were accessible more quickly and easily.

The compactness of microfilm records also permits making duplicate sets without straining existing storage facilities.

For example, a full complement of drawings can be stored in offices of purchasing, parts order, and research departments. In most circumstances, a filing cabinet or two will hold all aperture cards required for current use. Of course, such departments should be equipped with viewers and/or enlarger-printer machines as required.

Duplication also enables a firm to ensure valuable prints from loss due to disaster or theft. Since microfilm copies are so compact, this type of remote storage is relatively inexpensive. If storage space at the main plant is at a premium, the original drawings can be stored in a remote location and the microfilm copies retained for active use.

Rapid, inexpensive inter-plant distribution of drawings is facilitated by microfilming. Microfilms in quantity can be sent through the mails from a main plant to a branch in a small package. Drawings or changes originated in a branch can be put on microfilm and sent to the main plant for incorporation in a master microfilm file. Thus, drawings can be centralized or decentralized to any extent required.

Up to this point we have been considering only live storage — that is, storage of microfilm that is used during current operations. However, the microfilm technique is decidedly advantageous for dead storage as well. Old drawings can be preserved in a minimum of space and are much more readily available than full-size documents closely packed in storage rooms.

Quality drawings required

Like any system, microfilming cannot be considered only by itself. If engineering drawings are microfilmed, the success of the operation depends, ultimately, on the quality of the drawings themselves. Drawings to be reproduced on microfilm must withstand reduction without loss of legibility.

Firms that rely heavily on microfilming have, in many cases, set up training programs to ensure that draftsmen meet higher standards required. Fundamental to these standards is an emphasis on clarity.

Considerable emphasis is being placed on the use of open lettering, and maximum use of paper surface when the original drawing is made. All too often drawings prepared in the past have been crowded to one side of the page, and lettering has been too small and too crowded. Although this is not as critical in same-size reproduction, it can make the difference between failure and success in microfilming. Clarity can also be increased by eliminating unnecessary details from drawings.

Suppliers of materials and equipment used in microfilm systems have been remarkably co-operative in pooling information that might contribute to developing the field as a whole. Many of these firms have information readily available on how firms in a particular business have solved specific problems through the use of microfilm systems. This data should be of value to anyone contemplating converting to an automated microfilm system.

Automated systems

Microfilmed engineering drawing systems can be as elementary or as complex as required by the user. If it is desired simply to provide a security function, then the film can be filed in a remote vault in roll form, available for any emergency that may occur.

In addition to the security function, a master aperture deck of filmed drawings may be utilized to provide enlargements, for reference or reproducible print.

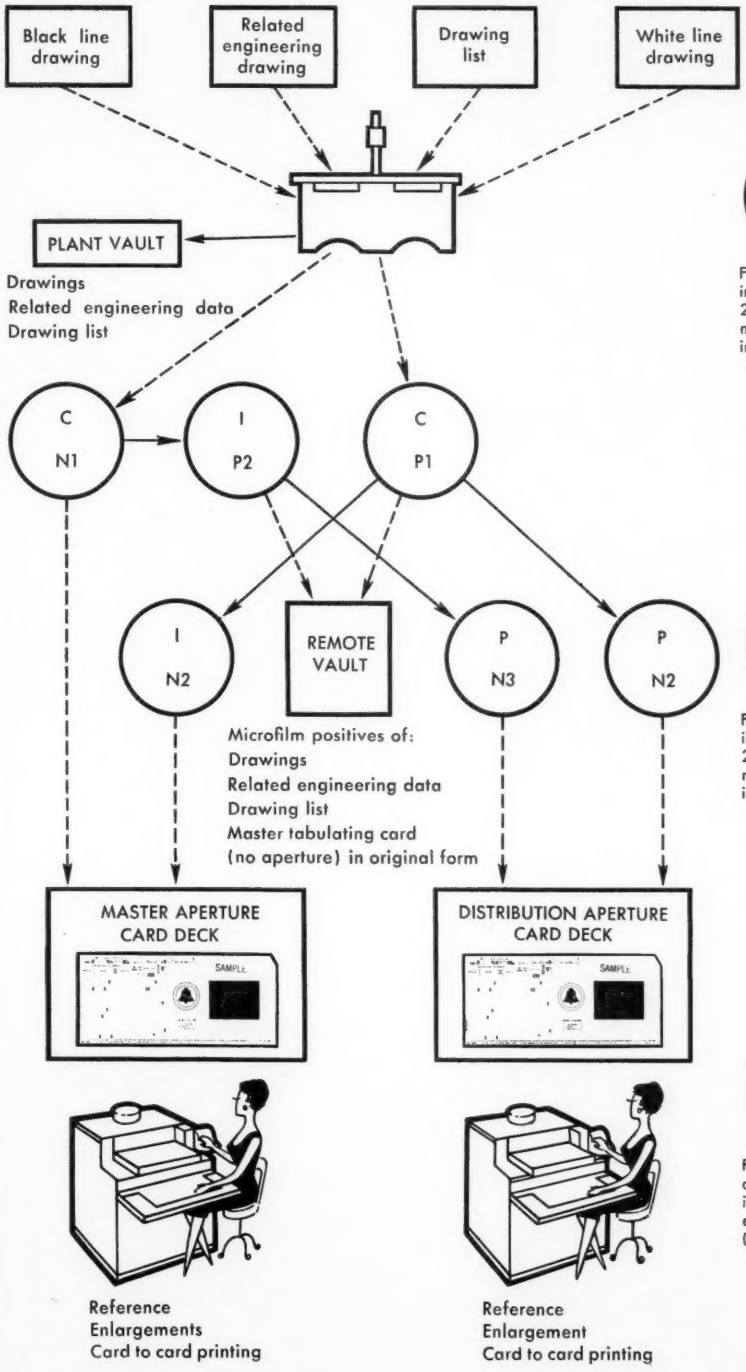
A third function may be added by the inauguration of a distribution deck, which is available for reference without the necessity of making an enlargement or print. These three functions are illustrated graphically in figure X.

The system adopted by any one company will depend on a number of factors, including:

1. The specific objectives the company hopes to achieve in a microfilm program, and the relative importance of each. Speed of location and filing may be the prime consideration in one place, while another may want permanency of files.
2. The location of the company. If a company has engineering offices scattered throughout the country, its system might include a method for making microfilm duplicates for distribution.
3. The number of prints required by the company and its suppliers. A company with high print needs, for instance, will certainly want to include in its system a method of producing prints quickly and at low cost.
4. The types of drawings produced by the company and their relative useful life. Where drawings are revised frequently presents a special problem.

The ultimate in systems, of course, provides for the complete automation of the drawing handling function. This is usually accomplished by an integrated system with the regular accounting and bookkeeping data processing equipment. Since the cards have been specifically designed to permit such a program, it is readily set up. ★

Flow chart for security, master aperture card deck, and distribution deck package



KEY

Functions of camera positive image film (CP1) and compatible 2nd generation low contrast intermediate print film (IP2), positive image.

a. Security — stored in remote vault in roll form for automatic enlargement.

b. Used as the print film for rolls of negative image film for aperture card mounting in distribution deck, and source of future generation rolls for distribution decks.

Functions of camera negative image film (CN1) and compatible 2nd generation low contrast intermediate print film (IN2), negative image.

a. In Roll Form—production of electrostatic sulphite, vellum, or offset master enlargements.

b. In Master Aperture Card Form—card to card Diazo duplication, reference, and enlargement (silver or electrostatic) for a reference or reproducible print.

Functions of 3rd generation standard positive film (PN3), negative image and compatible 2nd generation standard positive film (PN2), negative image.

a. In distribution aperture card form—card to card duplication, reference and enlargement for reference.

Fig 1. Modern drafting equipment eliminates gymnastics for person at the board. Unit has finger-tip control.

Fatigue - the greatest enemy of accuracy

Precision equipment gives draftsman the working flexibility he needs

Win Straube, B.A.(Comm.)

Exclusive DE Feature

The aim of every manufacturer is a product that will sell. In spite of this, the factors that contribute to the comfort and efficiency of designers and draftsmen (with whom rests the responsibility of creating saleable products) are so often ignored.

This article is based on a report of tests carried out by the Battelle Institute of Columbus, Ohio, and points to the need for thought on the subject of production in the drawing office where all production begins.

Just how big a part does the draftsman's equipment play in his efficiency? For the purpose of tabulating results, each type of test equipment is indicated by the initial letter shown.

TH. T-square and set squares on a horizontal board.
PH. Counterbalanced parallel motion and set squares on a horizontal board.
PU. Counterbalanced parallel motion and set squares on an upright adjustable board.
DH. Standard drafting machine on a horizontal board.
DU. Standard drafting machine on an upright adjustable board.
DZU. Drafting machine with an adjustable zero head on an upright adjustable board.

Mr. Straube is vice-president and executive director of Kuhlmann Straube Company Ltd., of Oakville, Ontario.

Test drawings made included an uncomplicated engine part, an architectural drawing and a fairly difficult assembly drawing with main group arranged about centre lines inclined at different angles.

To create a measuring standard, the average time taken to produce the first drawing was estimated, each draftsman using a standard drafting machine at an upright adjustable board. This average time of 55 minutes is expressed as 100% in the tables below and is compared proportionately with the times taken to produce the same drawing using the various other test equipment.

Drawing equipment	DU	PU	DH	PH	TH
% Working time	100	117	123	128	139

This test clearly shows the advantage of the drafting machines at an upright adjustable board. It is interesting to note that the test was completed in faster time with the parallel motion unit and an upright board than with a drafting machine at a horizontal board, indicating that for this test, board position was more important than the drafting machine.

Most of this drawing was concentrated between 19¾ in. and 23½ in. above the lower edge of the board. Working at horizontal boards, draftsmen were forced to bend and could rest their arms only temporarily. Neither hands nor arms could be rested on the board while drawing and the considerable strain involved no doubt accounts for the increased time taken under such conditions.

The second test was designed to produce conditions said to favor the use of T-squares and parallel motion units.

It has long been held that the drafting machine cannot compete with this equipment where the design demands the drawing of long horizontal lines. But the test drawing disproved this theory. In fact, test drawings produced with a parallel motion unit at an upright board required 25% more time, and with a T-square 31% more time, than with the drafting machine. The final test drawing was of a four stroke internal combustion engine. The results show great advantages in the use of drafting heads with adjustable zero for this type of work. These heads permit the necessary contant change of drawing base angles without calculation. Actual times were as follows:

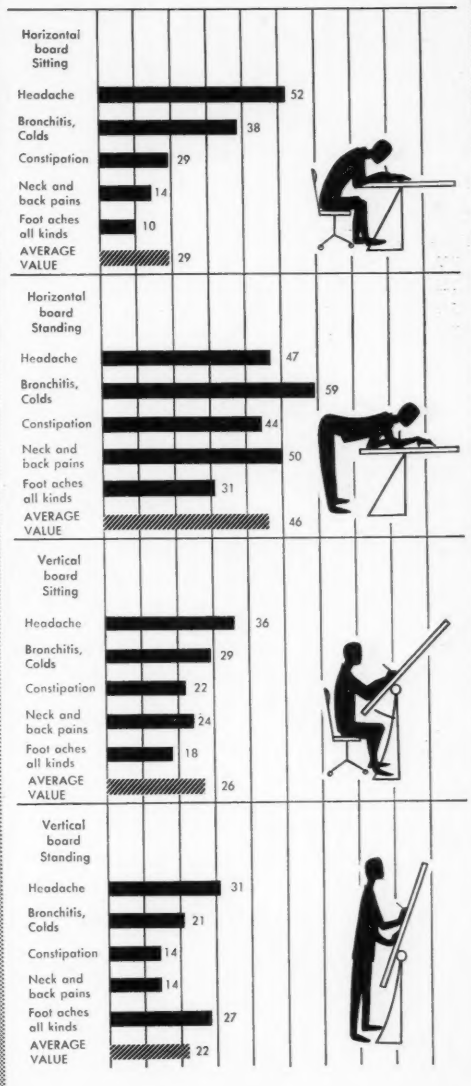
Drawing equipment	DU	DZU	PU	PH
% Working time	100	84	120	141

The above individual tests and the following figures prove conclusively that the drafting machine on an upright adjustable board is the most suitable equipment from the aspect of speedy working.

Drawing equipment	**% Working time simple drawing**	**% Working time difficult drawing**	**Mean % work time**
DU	100	100	100
DZU	100	84	92
PU	115	125	120
DH	120	130	125
PH	130	140	135
TH	130	150	140

To eleminate the fatigue factor, short tests of one minute were carried out and in order that only the purely mechanical work of drawing was involved, each draftsman was allowed practice time on each piece of equip-

Fatigue vs. sickness rate in the drafting office in %



The main physical strain put on an engineer or draftsman working at the drawing board, such as regular fatigue, and many symptoms caused by working on a horizontal or slightly inclined board, can be greatly reduced, if not eliminated, by the use of modern drafting equipment.

Statistics shown are excerpts from the Battelle Report on drafting fatigue and efficiency.

continued ▶

ment making drawings of the simple figures chosen for the test.

As in previous tests, the time taken when using a standard drafting machine and an upright adjustable board, were taken as the measuring standard and are again expressed as 100% to the following tables.

Examining these figures it will be seen from DU, DH and PU, PH that board position has made little difference to the working times with similar equipment. The mean times for PH, TH, PU are similar but they are more than 100% longer than those for DU and DH, thus proving absolutely the simplification of work made possible by the drafting machine.

Drawing equipment	Triangle	Rectangle	Mean % working time
DU	100	100	100
DH	98	99	99
PH	210	200	205
TH	225	194	210
PU	247	189	218

The movement diagrams in figure 2 illustrate that even on the most simple drawings, the drafting machines can save a great deal of movement and so reduce fatigue. Results from 10,000 tests made on horizontal boards, show that between 50 and 75% of drafting errors and inaccuracies occur when working at the top of the board where maintenance of a convenient working position is most fatiguing.

The draftsman's working position and the equipment he uses have an effect on his health also, quite apart from its influence on his efficiency.

The tests carried out by Battelle were not of long enough duration to reach definite conclusions but the following observations are nevertheless of interest.

Four working positions were involved in these tests —sitting or standing at a horizontal board and sitting or standing at an upright adjustable board.

When working at a horizontal board the draftsman perspired more freely and both pulse and respiratory rates increased.

This rate increase lasted for an average of four to six minutes before being returned to normal by the body's regulating function.

Interviews with 300 draftsmen produced information on the incidence of common complaints and are shown as percentages in the presentation on page 51.

It was found that the energy consumed by the person who maintains a stooping position is 40% to 50% greater than that consumed in a normal standing position. The increased use of back muscles to maintain a convenient working position accounted for much of this increase and is undoubtedly responsible for the much higher incidence of backaches. Foot complaints must be expected from draftsmen who stand to do their work.

When the French Ministry of Education appointed a committee to investigate the causes of absenteeism in government departments their report (the results of which were published in "Annales d'Hygiene") stated that working at the horizontal board "inevitably results in deformation of bone structure and in most cases results in painful disturbances of the digestive organs. Compression of the thorax (when stooping or leaning over a board) can also cause considerable functional complaints in the respiratory organs, since sound respiration is inhibited and vital capacity reduced."

Equipment that permits almost ideal working conditions for draftsmen is of course available in the modern drafting machine and drawing stands that are adjustable at a finger pressure.

Draftsmen today look for pleasant working conditions, including good up-to-date equipment. If your company has been losing its drawing office employees to competitors, or if the response to your recruiting campaigns has not brought in the desired number of new men, then the problem might be centred right around the facilities which are being provided.

If you still have the traditional fixed horizontal drawing board and T-square, then it is no wonder the good men are going elsewhere. If your firm wants to be recognized as a leader in the community, a place that workers prefer, then it must be prepared to provide the best. ★

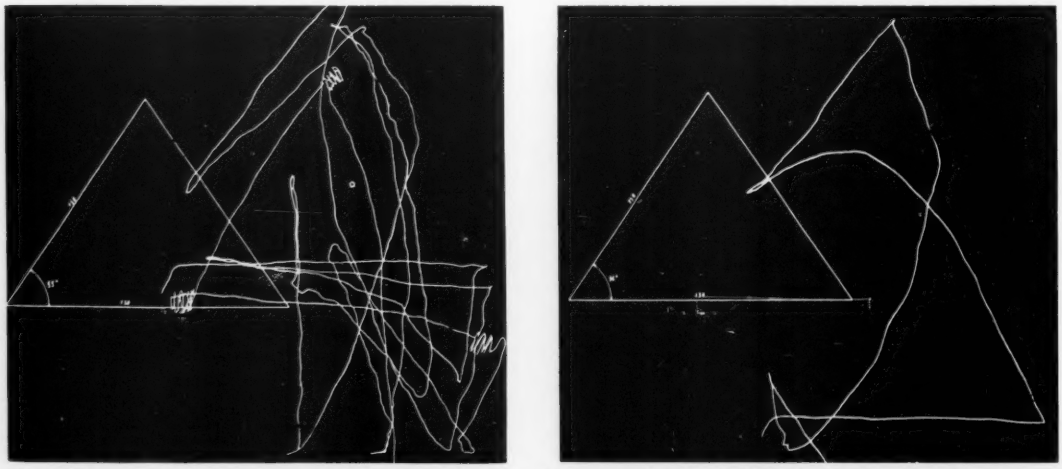


Fig 2. Before and after studies. At left is seen the work of draftsman's hand when drawing a triangle using an ordinary T-square. Same task when performed on modern drafting machine at right. Notice how work is reduced.

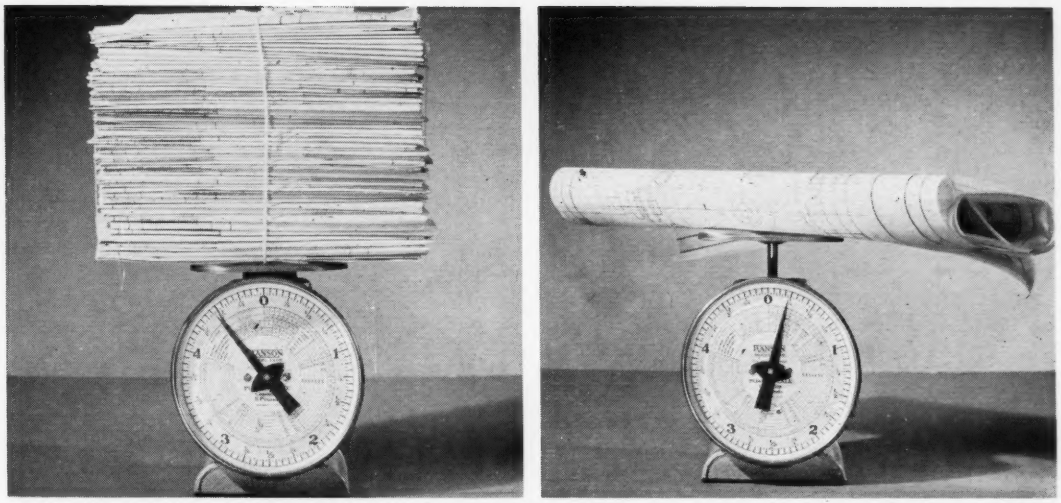


Fig. 1. How many prints of a drawing does a branch plant or subcontractor need? Too few can mean costly delay, too many can be expensive (see scale, left). Shipping intermediates solves problem for sender and recipient.

Modern drawing reproduction processes

A compendium (with hints) on the latest methods and materials available

Kenneth H. Jones

Exclusive DE Feature

Today it is essential that every drafting supervisor keep up to date on the latest methods and materials available for the reproduction of drawings.

Whether you want to protect original designs, reclaim old drawings, improve legibility, combine designs or speed up revisions, there is a reproduction method specifically designed to meet your need.

When that important drawing comes off the board it represents many hours of work. It is a record and guide developed from numerous experiments and calculations. Its life depends on how it is treated. Even when handled with "kid gloves", it will soon become soiled and worn. Because of this, it is desirable to make reproductions of the original and to work with the copies.

Mr. Jones author of this article, is technical consultant with Canadian Kodak Company Limited of Toronto.

Simplify print distribution

It is often difficult to determine how many prints of a drawing each branch plant or company group is going to need. Failure to send enough can result in costly delays. However, shipping large quantities of prints can prove expensive and troublesome. By sending intermediates and letting each plant make the number of prints they require, this problem is solved. (See fig. 1.

Protect original drawings

There are various ways of obtaining crisp, clear copies of original drawings, depending on your present photo-copying equipment. Fast, size-as direct process prints or blueprints can be made in ordinary room light from autopositive intermediates. These intermediates

continued ▶

are low in cost and ideal as printmaking masters, and for reference, revision and mailing.

Should your facilities favor a darkroom procedure, a size-as contact paper negative can be made from the original drawing. From this negative, contact paper positives can be made. These are especially valuable for reproducing originals, with very fine detail, for drawings in poor condition and for printed halftone originals. These positives can be used as intermediates from which any number of direct process prints or blueprints may be made.

Enlargements and reductions

In the field of direct positive copying of drawings or documents, autopositive projection papers, first introduced during 1959, yield top-quality positive prints from positive originals when exposed in a process camera or enlarger. Unlike conventional positive-type papers, which are limited to contact printing, these new papers can also produce reduced or enlarged copies of positive originals.

The new paper is available in different weights. The standard weight is designed for exposure in a process camera or enlarger. It is used for making positive copies of drawings, paste-ups and other originals. The extra-thin weight was specially designed for use with either a process-type or flow-type camera for producing a reduced-size intermediate from which final prints can be made. The reduced-size copies mean substantial savings in space and in diazo print materials for engineering departments.

Autopositive projection paper has a special wash-off type emulsion that requires no fixing, reduces processing time. The exposed paper is developed for one minute at 71 F. Then the emulsion side is sprayed with cold water. The top emulsion layer crumbles and washes away, exposing the positive image. Normal washing is then required, but there is no fixing bath.

Fig. 2. Here's a way to save on drafting time. Instead of retracing an entire drawing when it needs revision, "scissor out" unwanted detail. Then add new design on same, or second print; company reproduction department can do job, freeing draftsmen for creative work.

Fig. 3. Print making masters from blueprints, direct-process prints, and originals on heavy stock using reproduction materials, can be had without production delays.

Restore old drawings

Occasionally, it is necessary to work from old, soiled drawings, often creased and yellowed with age. This problem can be solved and even faint details restored to original quality when an autopositive intermediate is made.

In the darkroom, a contact paper negative of unexcelled quality can be produced. Clean open lines, and a dense black background which requires a minimum of opaquing is the major characteristic of this product. The smooth surface takes pen or pencil notations and may be folded without cracking.

Reproduce blueprints and direct-process prints

In some cases, it is necessary to reproduce extra prints from either direct-process prints or blueprints. This need for making print masters capable of producing copies of satisfactory quality can, on occasion, divert production delays that occur while waiting for prints from the home office.

From an original direct-process print an autopositive paper intermediate is prepared. This intermediate can be fed through a machine hundreds of times to produce additional direct-process prints of outstanding legibility.

If the original is a blueprint there are two processes of equal quality available for room light reproduction. First, an autopositive intermediate can be made from the blueprint, then any quantity of blue-line prints can be made from the intermediate.

Secondly, a repro-negative paper intermediate can be produced. Primarily used for making positive copies from negative originals or vice-versa, this medium-high-contrast paper intermediate can then be used as a printmaking master to produce the required direct-process prints.

Should you require a darkroom process, a positive contact paper intermediate must be made from the original blueprint. The intermediate may then be used

Fig. 4. No need to renew old drawings. New techniques allow them to be reclaimed — crisp and clean.

Fig. 5. New halftone process allows photographs of existing equipment to be used in place of actual drawings.

to produce any number of crisp, clear direct process prints that are needed.

Speed revisions of drawings

Valuable time can be saved when revisions are required on drawings. Instead of retracing the entire drawing, make a Kodagraph reproduction, then eradicate or "scissor out" the unwanted detail. (Fig. 2.)

The retained portions of the print are attached with transparent tape to autopositive film; this film is highly translucent, tough, durable, and offers a matte surface on both sides that readily accepts pencil or pen notations.

When the changes are completed, an autopositive paper intermediate is made from the film paste-up. From this intermediate any number of direct-process prints or blueprints can be made. Most of this work can be done by the reproduction department leaving the draftsmen free for creative work.

The darkroom operation is similar. A contact paper negative is made, then the unwanted areas are opaqued out. A negative is next made of the new drawing forms with the centre area of the form masked with black paper. The portions of the print to be retained are attached to the film negative with black tape and a contact paper positive is made. This positive serves as a printmaking master.

Combining standard designs

When standard component designs are used over and over in the preparation of new drawings, much time and money can be saved by having these design elements reproduced on autopositive film and used as templates to "build up" the drawing. Preprinted templates of standard components are available from a number of firms in Canada. Using double-coated transparent tape, the templates are attached in the proper position to an autopositive film print. From this paste-up an autopositive intermediate is made, which in turn is used to make prints.

Save drafting time with photodrawings

Photodrawing is the technique of using photographs to convey dimension, position and identification in the same manner as engineering drawings.

For example, when a change is made in an existing installation covered by a drawing on file, a careful check of a print must be made on location to make sure the original installation was made as specified and that any changes were noted on the drawing. With photodrawings, the information is current as the day the photograph was taken and no checking is necessary.

From a suitable film negative of the installation, a halftone film positive is produced. The halftone positive is attached with transparent tape to an autopositive film print of the drawing. Notations and details are added in pen or pencil to the film print, which then serves as a printmaking master for direct process prints or blueprints.

Verifax copies

There are many occasions when Verifax copying can be put to good use in the drafting room. Primarily, it was designed to supply speedy reproductions of small drawings, production orders, office memos and correspondence.

These examples outline some of the many methods of photographic reproductions designed to aid the engineering department. From the original drawing to almost every phase of operation where reproductions are used, modern reproduction processes give consistent top-notch quality at a saving of time and money. ★

Advanced mathematical instruments simplify design work

They're not gadgets — and not used enough, says university professor

Exclusive DE Feature

S. S. Lazier, M.A.Sc., P.Eng.

How much engineering design is avoided because of the tedious analysis, and expense, inherent in even many simple problems? How often do designers play it safe by "over design" rather than spend the time and money performing the numerous repetitive calculations required to investigate alternative designs?

Much of the tedium of repetitive calculations can be avoided by the use of appropriate modern mathematical instruments. Such instruments, unlike numerical computers, are suitable for the direct extraction of engineering data from graphical information such as charts, maps and drawings. Mathematical instruments are indeed graphical computers and may be used in almost any field of engineering design. At present such instruments are used in the fields of ship, aircraft, road, bridge, hydrological, electrical and machine design and, in the analysis of process data recorded on strip or circular charts.

It is the purpose of this article to describe briefly some of the mathematical instruments now available.

Planimeters

Figure 1 shows a modern polar planimeter which may be used to measure the area of irregular figures. It is equipped with a weighted pole instead of the old-fashioned pin and a magnifying tracing lens instead of a tracing point, which permits the operator to follow a line carefully and without parallax. A reading glass for the vernier scale is also available, though not a new feature.

The area which a fixed pole planimeter will cover is limited by the length of its arms. For the tracing of large areas a polar planimeter may be attached to a track, as shown in fig. 2, and be allowed to move along the track while operating. An alternative arrangement is shown in fig. 3 wherein the area to be traced may be moved past the planimeter through suitable guides.

For extremely accurate work a disc type planimeter, shown in fig. 4, may be used. The movements of the tracing head are transmitted to the recording wheel through a disc which amplifies them, by perhaps 10:1, with a consequent increase in accuracy of about 250%

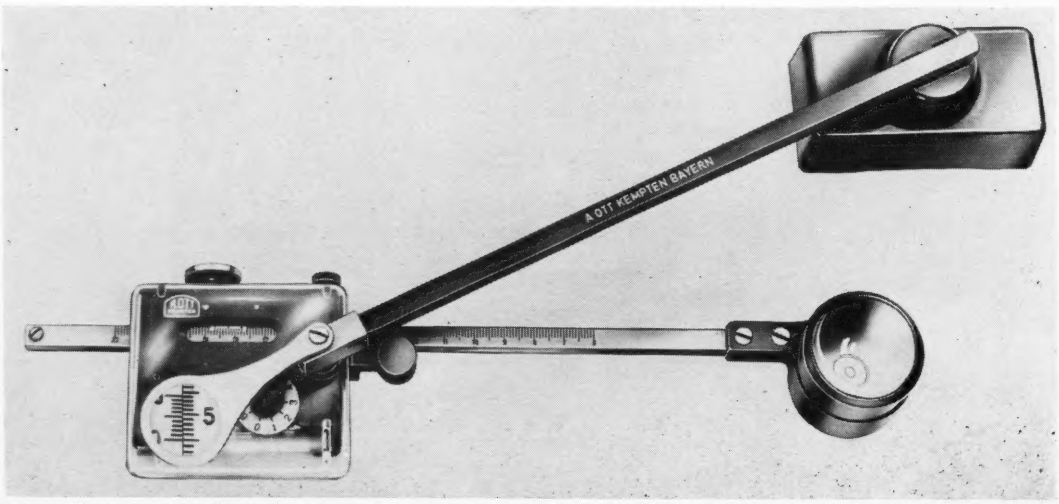


Fig 1. Modern polar planimeter is used to measure area of irregular figures. Weighted pole, magnifying lens used.

over normal polar planimeters. The disc planimeter shown is set upon rollers and, having no fixed pole, is suitable for measuring large areas.

There are other special types of planimeters such as a radial planimeter whose pole may be fixed at the centre of a circular chart. Most manufacturers will supply instruments that read directly in specified units.

Integrators

Of all the mathematical procedures encountered in design perhaps the most tiresome is the evaluation of the moments of area for an irregular shape (see November, 1959, page 58). The potential planimeter (fig 5), also called an integrator, will perform these operations quickly and accurately. The four recording wheels will indicate the area, the first moment of area, the second moment of area and the third moment of area respectively for only one circuit of the tracing head. These instruments are particularly useful in machine and structural design because they allow the designer to investigate numerous shapes in a short time, thus helping in the selection of the most economical shape. Instruments with fewer recording wheels are available if only first and second moments are required.

The Stieltjes type planimeter, shown in fig 6, is really a three-dimensional integrator, in that, if the shape of a body may be described by two curves, one in each of two planes, then the volume of the body may be determined by plotting the curves on separate sheets and placing them on the two tracing tables. The two curves may then be traced successively and the volume enclosed by the curves read off the single recording wheel.

Other types of integrators include the "integraph" which will plot on a separate sheet the integral curve (or cumulative area under) an irregular curve which is traced by the head of the instrument.

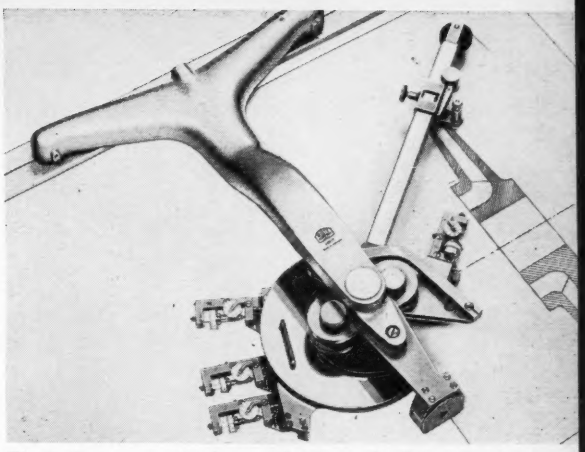


Fig 5. For moments of area, the four-wheel integrator.

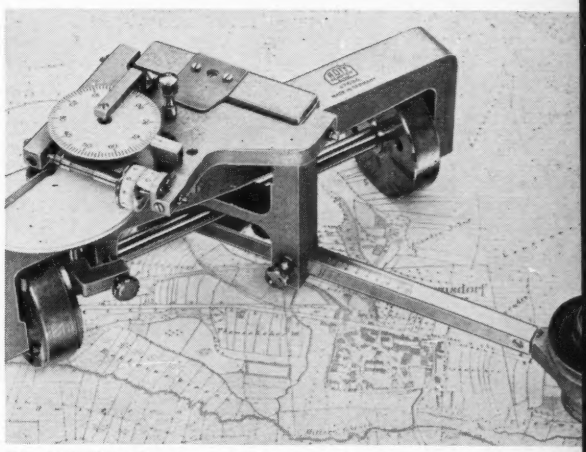


Fig 4. Rolling disc type planimeter for extreme accuracy.

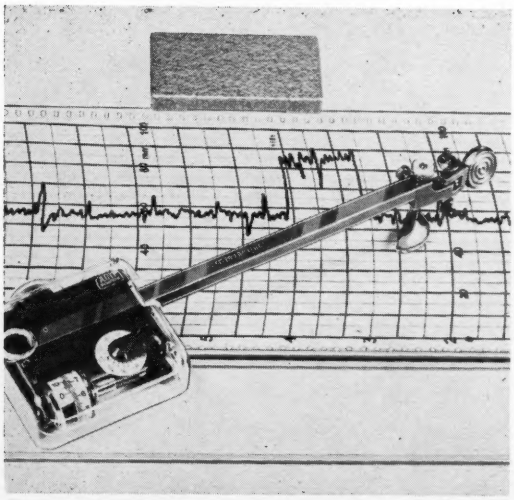


Fig. 2. Polar planimeter can be attached to fixed track.

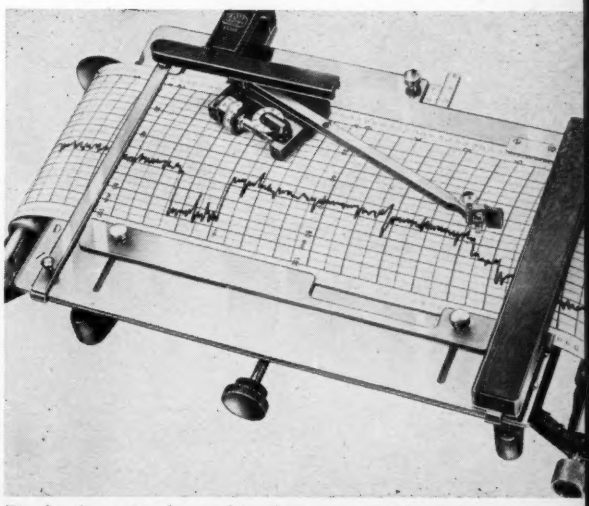


Fig 3. On strip chart table planimeter, tracing area moves.

continued ▶

Derivimeter

The derivimeter, fig 7, may be used to determine the slope of an irregular curve at a point much more quickly and accurately than drawing a tangent. This instrument is essentially a protractor with a movable mirror mounted at right angles to the plane of the degree circle. The zero line of the protractor is laid parallel to the abscissa of the curve with its centre at the required point on the curve. The mirror is then rotated until the reflection of the curve appears as an extension of the curve itself. The slope is then read off the vernier scale to an accuracy of ± 0.2 degrees for the instrument shown.

Pantographs

Hidden away in the cupboards of many design offices may be found ancient pantographs — perhaps some of their shaky wooden arms are broken or warped while pins and strings are lost. The modern pantograph is a far cry from its ancestors; it is a precision instrument carefully made, usually from stainless steel, and capable of reducing and enlarging drawings with a mean error of ± 0.005 inches. Fig 8 illustrates a modern pantograph which is fitted with a tracing lens for easy and accurate work, and, a cable release device on the copying pen which allows the draughtsman to move the tracing pen freely about the drawing and to pick up details missed during the first tracing. The copying pen may be charged with ink and thus a finished drawing is produced from a single operation.

There are many other advanced mathematical instruments whose use will permit an increase in the output, accuracy and efficiency of the work from a design office. Designers schooled in traditional methods will at first find it takes some time to acquire facility and confidence in the operation of the more complicated instruments but, in the long run, the continuous saving of labor will be in itself quite worthwhile. Since mathematical instruments are purely mechanical in operation they are admirably suited for the use of inexperienced and junior staff, thus releasing the designer from tedious calculations and enabling him to spend more time making decisions requiring his experience and judgment.

Mathematical instruments are carefully manufactured, hence they are not inexpensive. They are not "gadgets" and should not be purchased as such. Rather, they are precision, graphical computors whose purchase should be regarded in the cold light of demand for their services. An instrument used only occasionally soon finds its way into dead storage, or the operator spends more time looking for and reading the instruction book and trying to remember how the blasted thing works than the job warrants. Probably he will end up checking the instrument anyway! However, where economically justified, the use of mathematical instruments will more than offset their initial capital cost and, indeed, the design office will become a happier, more productive and more efficient part of the organization. ★

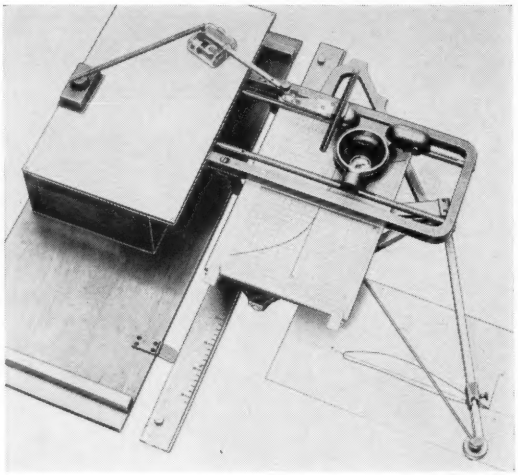


Fig 6. Stieltjes (or three dimensional type) planimeter.

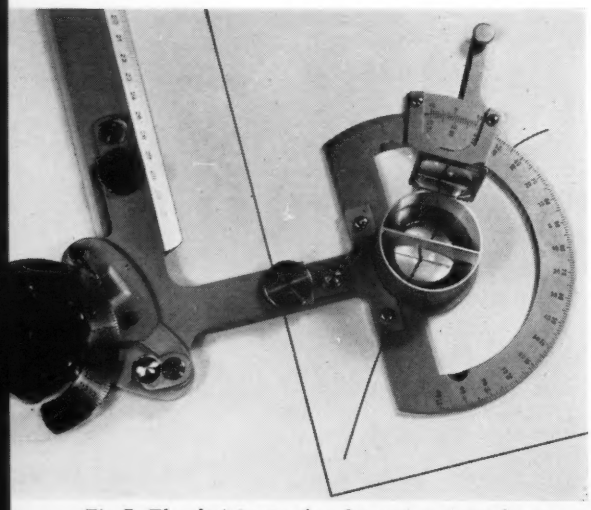


Fig 7. The derivimeter for slope of an irregular curve.

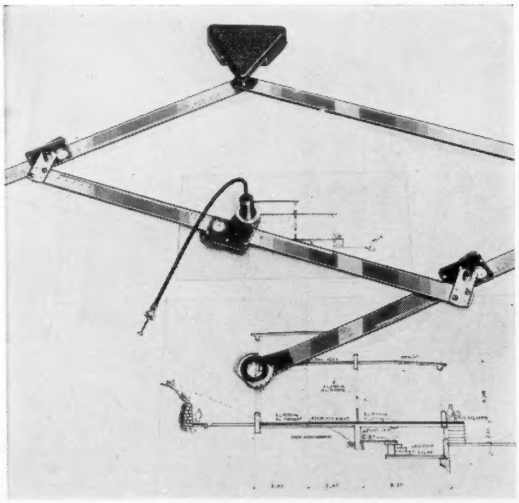
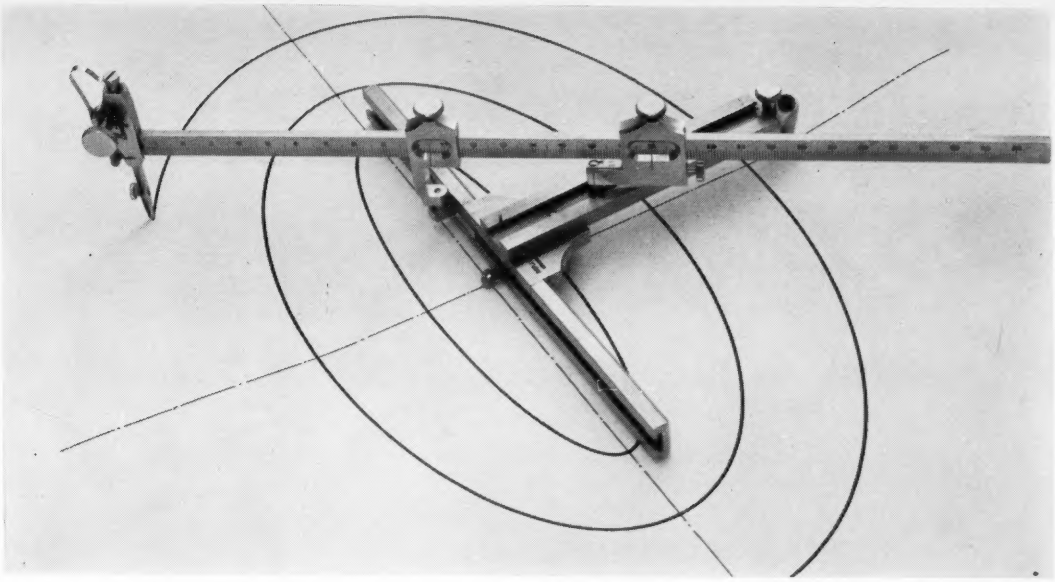


Fig 8. Pantograph with tracing lens, cable release pen.



Focus on precision drawing instruments

Average Canadian design office is neglected step-child of management

James W. Stevenson

Exclusive DE Feature

The old-fashioned drafting stool still seems to dominate the scene in the average Canadian drafting office. It is usually just a bit higher than the 1960 family sedan from Detroit. The man at the board climbs up there in the morning, but being up there certainly does not give him any feeling of superiority nor does it boost his morale to new heights, as probably intended by thoughtful management.

The author has had considerable opportunity, over the last ten years, to visit design and engineering offices throughout Canada. It is inevitable that such visits should lead to a desire to evaluate the many things seen, to digest the information received from the people at the board, and to try and compare the different design, engineering and drafting offices.

One conclusion must be reached by anybody who has gone to the trouble of seriously studying this field. *The average Canadian design and drafting office is the neglected step-child of management.*

To avoid any misunderstanding, it must be made quite clear that we have seen some extremely well equipped and streamlined drafting rooms in Canada, but they are the exception rather than the rule.

As long as management will not invest to provide the basic facility to create overall efficiency of the design and drafting activities, the man at the board will not invest the few dollars needed for the essential quality tools required to be fully efficient. Why should he take too great an interest in his own efficiency if management does not seem to be interested? The poor drafting tools owned by the man working at the drafting board very often only reflect the attitude of management toward drafting operations as a whole.

Mr. Stevenson, author of this article, is president of James W. Stevenson and Company Limited, Toronto.

What does it cost?

In most offices the draftsmen and designers are required to supply their own instruments and tools. What does this mean in terms of money? Is it a large investment? Compared to what some tradesmen have to provide — the answer is "No".

If the draftsman buys all the quality instruments and tools needed for his work, he will have to spend between $60 and $80. Most of these instruments, with reasonable care, will last him a lifetime. If we consider annual costs for replacements and additional equipment at $10 a year, a man at the board would have to spend — let's say — over a period of 10 years, the amount of $170.

These figures have been developed after careful study of the selection of drafting instruments, drafting tools, slide rules and mechanical pencils offered by Toronto's leading retailer. The estimate includes only the top quality equipment of the world's leading manufacturers and includes the price of a 10 in. Log slide rule.

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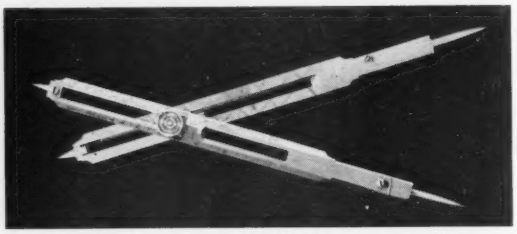


Fig. 2. Good proportional divider can save its cost.

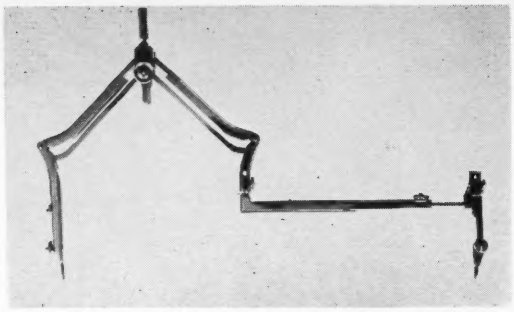


Fig. 4. Parallel compass with horizontal bar, telescope.

Some observations

The replacement, or rather, the non-replacement of worn-out drafting equipment, like the replacement of all other obsolete production equipment, can lead to uneconomic situations.

For instance, we have seen a man at the drafting board re-engraving a six year old 10 in. scale with a compass point; it took him only two hours of his employer's time. The scale was then good for another six months. The cost of this job to management, at $4 an hour, was $8. The price of a new scale is only $3.20.

Again, we observed two draftsmen helping each other with a string, a thumbtack and a pencil, to draw a circle with a ten inch radius. They did a perfect job; it took them thirty-five minutes. The firm employed ten draftsmen, but neither the company nor the draftsmen owned a proper beam compass.

The company must co-operate

There are many more stories like the above. But the story we like best to tell is about one of the larger firms in Canada. After completely re-organizing their drafting operation, the company purchased all the instruments for their draftsmen according to their individual needs and wishes, then simply deducted the cost, over a period of several months, from their pay-cheques. This eliminated several problems for their draftsmen:

1. The draftsman could explain the situation to his wife and justify it, without long arguments—and that is most important.
2. The deductions from the pay envelope over a period gave the advantages of installments.
3. He got the equipment he always wanted and he got it in a rather painless way.

To the employer it gave the benefit of a noticeable increase in efficiency. Over and above that, management-employee relations improved greatly. The scheme was really appreciated all around.

Company-owned instruments

A few special instruments should be purchased and owned by any firm that is interested in efficient drafting rooms. These include such items as proportional divider, beam compass, protractor, planimeter, etc., and any other instrument that cannot normally be considered essential equipment for the man at the board.

Management is responsible

The men at the drafting boards across this big country do their vital share in the development of Canada. They help to create the products that sell, they engineer the machinery that produces, they design the buildings to house that machinery, they span the rivers with bridges, design the roads, and chart the seas to facilitate delivery of the product.

If management takes a serious interest in the general organization of the design and drafting operations and provides the proper equipment to do an honest day's work without undue stress and strain, management can rightfully expect the men at the boards to do their share and equip themselves with the instruments they need, without which an honest day's work simply cannot be done.

Everything starts on the drafting board. Maybe we should start there right now. ★

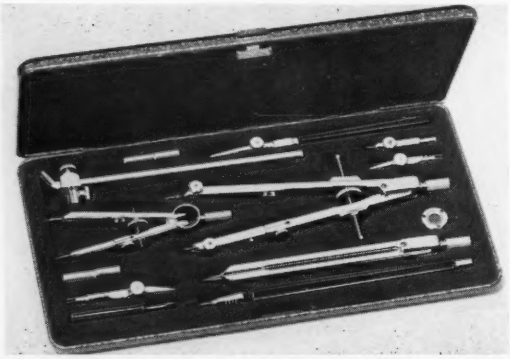
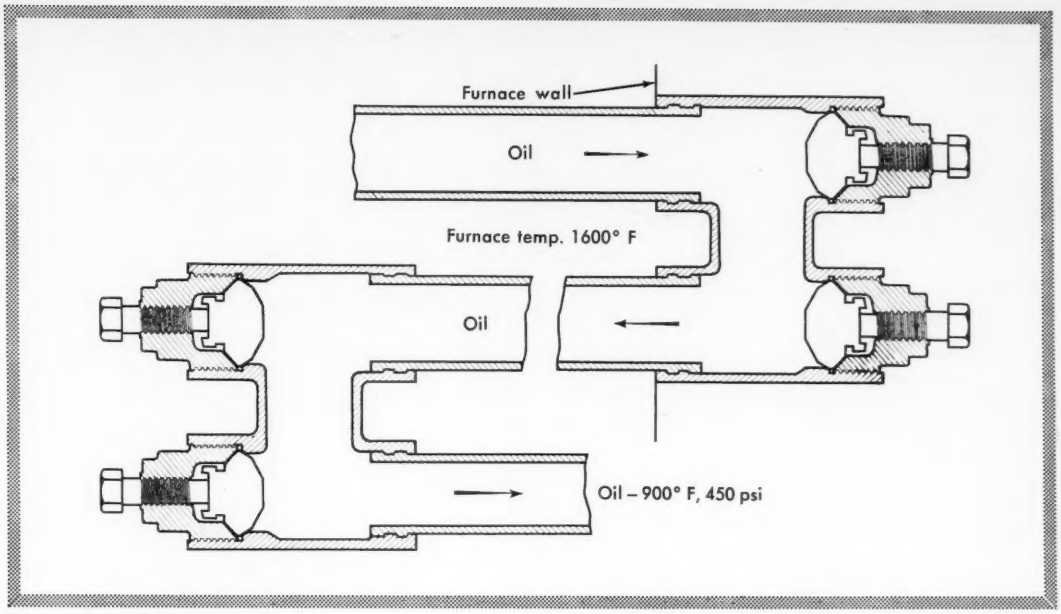


Fig. 3. A draftsman needs a basic instrument set, preferably in protective, plush-lined, steel case.

Required Equipment for the Draftsman

A set of first class instruments selected according to the requirements of his work, priced from	$22.50 to $36.00
If not included in the set, drop spring compass	5.50
2 triangular 12″ scales, $3.20 to $4.50 each	6.50 to 9.00
Set squares, French curves	10.00 to 10.00
3-4 mechanical clutch pencils .	4.50 to 6.00
A quality 10″ slide rule	11.00 to 19.00
	$60.00 to $80.00



The cast stainless header bodies serve as return bends to reverse oil flow through petroleum cracking furnace.

A lifetime of use with cast stainless

Severe combination of corrosive elements attack these oil-plant parts

Operating in a punishing corrosive environment, cast stainless header bodies have given years of trouble-free service and solved replacement problems in producing high-octane gasoline at the El Segundo plant of the Standard Oil Company of California. Serving as return bends to control the direction of oil flow through the furnace, these fittings combine the corrosion resistance of stainless alloys with the design advantages of the casting process.

The oils being processed in this plant are usually California crudes, which contain sulfur and other corrodents that cause carbon steel to corrode at a very high rate. Moreover, attack is greatly intensified by the high pressure and temperature at which these fluids are handled—450 psi and 900 F. To resist this severe combination of corrosive conditions, the header bodies were cast of type CF-8 (Alloy Casting Institute designation) stainless alloy. ACI type CF-8 casting alloy (corresponding to wrought type 304) contains 18-21 per cent chromium, 8-11 per cent nickel and a maximum of 0.08 per cent carbon.

As shown diagrammatically above, oil carried through the furnace tubes is channeled into the U-shaped section of the header, where flow is reversed and returned to the furnace through a lower tube. Tubes are rolled into the header body to produce tight, leak-proof seals.

The header is designed to allow for easy removal of coke which builds up in the headers and oil tubes after extended operation. A tube reamer can be inserted to clean out contaminants after undoing the holding members (bolt, threaded sleeve and plug) assembled into the fitting. The relatively corrosion-free surfaces of the header bodies facilitate this cleaning operation.

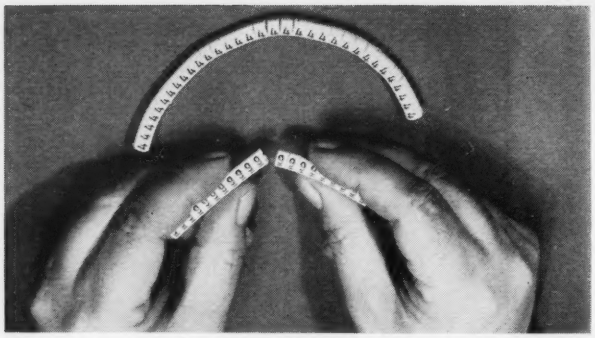
Casting design vs fabrication

An evaluation of the factors involved in producing complex shapes from both cast and wrought materials points up the suitability of the casting process for parts such as these header bodies. Fabrication of the header body from wrought materials would require a multiple-piece welded assembly. In austenitic alloys, welding causes precipitation of carbides along grain boundaries in the heat-affected zone, especially when fairly thick sections and prolonged welding time are involved. Post-weld annealing operations would be required to restore carbides into solution. This susceptibility of welded seams to intergranular corrosion introduces a possibility of mechanical failure and oil leakage.

By contrast, the integrally cast header body represents a more satisfactory and more economical design, since welding is avoided and machining requirements reduced. Another advantage of the single-piece cast body is good resistance to severe mechanical shock, a frequent cause of leakage in welded joints. Easily provided by cast design, generous fillets and radii eliminate crevices, prevent the entrapment of contaminants and aid cleaning operations.

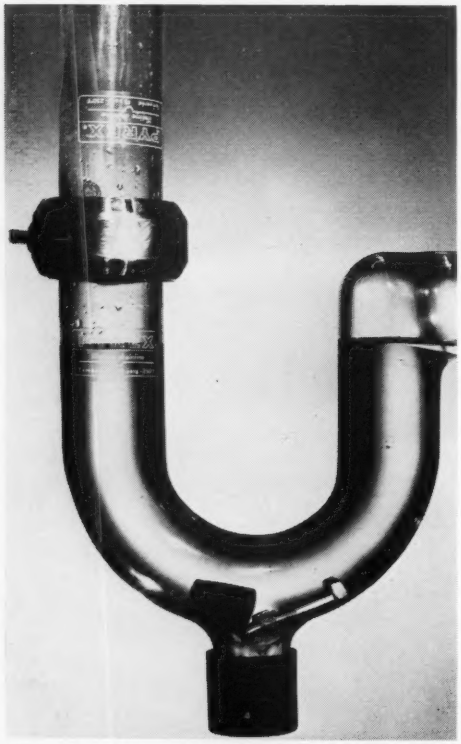
To ensure maximum corrosion resistance, the stainless castings are heat treated by water quenching from 2000 F and stress relieving at 1600 F. Carbon content is kept low (0.07 max) for improved corrosion resistance. These fittings meet ASTM specification A217-55, Grade C-12, which covers pressure-containing parts for high temperature service. Pre-use inspection requirements include X-ray examination and pressure tests with cold kerosene at 3000 psi. ★

Racket-scoop and ball of molded polyethylene form basis of game: take rough treatment — **300**



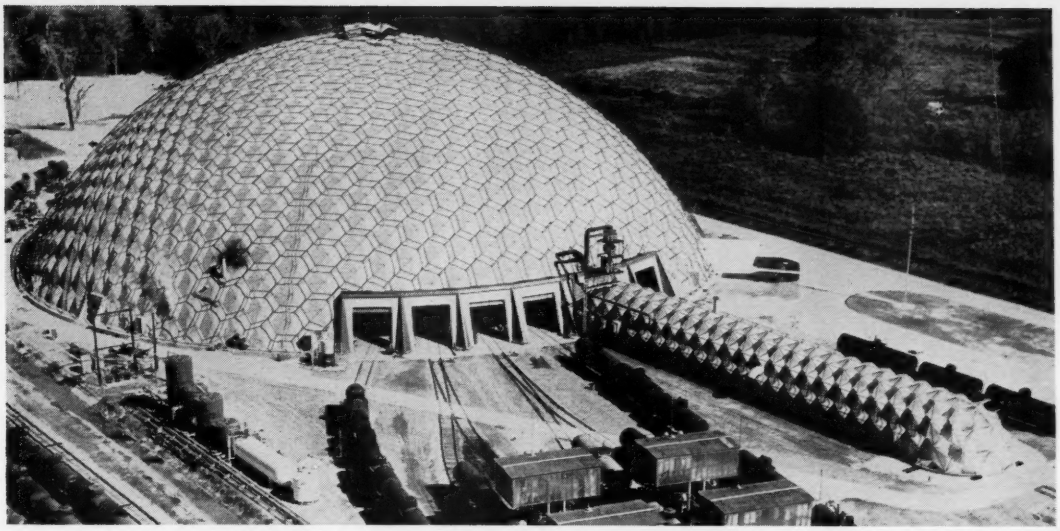
One-piece, completely closed, flexible marker was designed especially for small diameter bundles and cables. It's pleated — **302**

Design of flask allows easy disassembly for cleaning. Aluminum part (lower left) was replaced with polyethylene one (right)—**303**

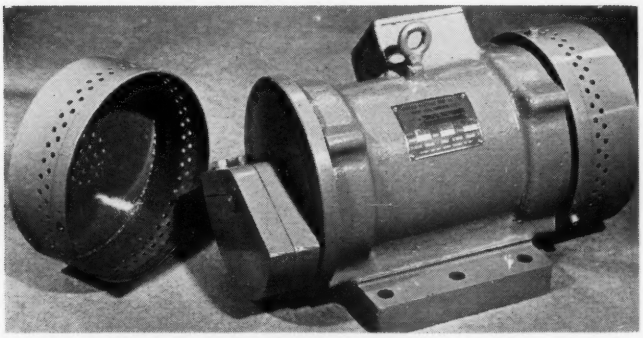


Items lost down drain are easily spotted and retrieved in this Pyrex drainline system — **301**

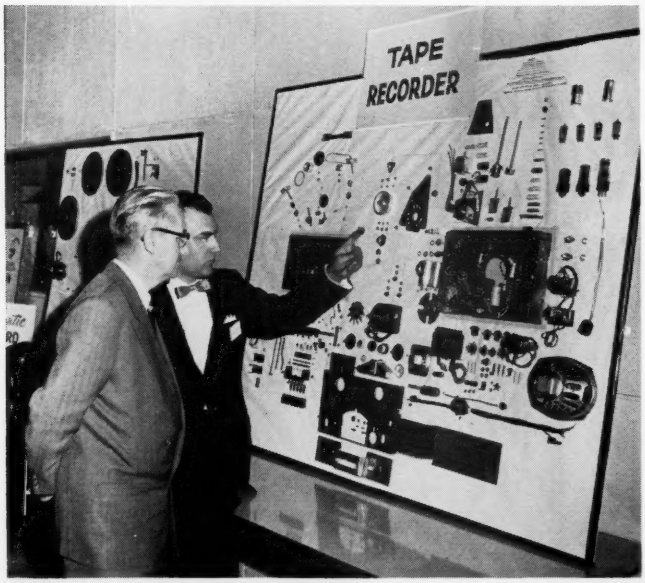
Designews in Pictures



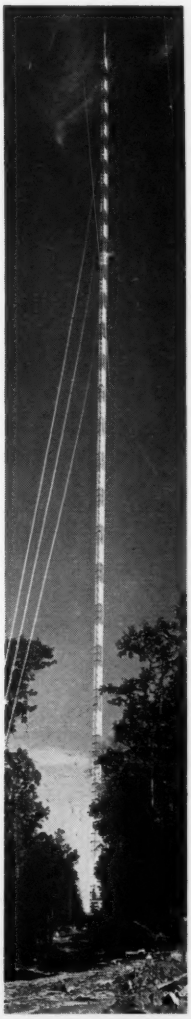
Big enough to house football field, ten stories high, repair shop is claimed world's largest clear-span dome — **304**



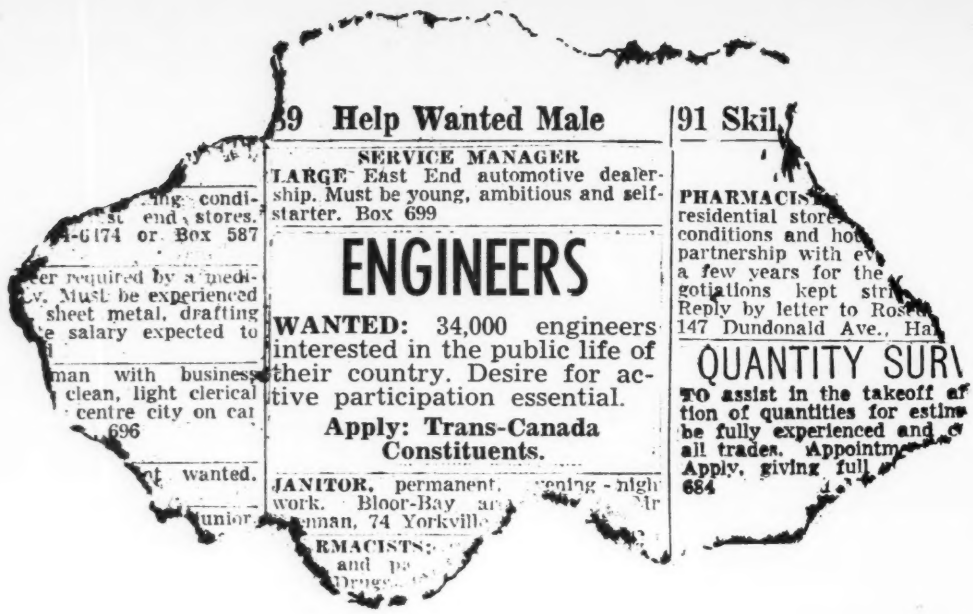
Few mechanical parts with self-contained vibrating drive motor — **305**



DE editor D. Kaill and J. Stafford, Seabreeze Co.'s design department chief, examine tape recorder components at press conference — **306**



WGAN-TV tower in Portland, Maine is 1,619 ft. tall (almost twice the height of the Eiffel Tower). It's designed to withstand 150 mph winds; has top sway of 6 ft. 3 in. at max. wind—**307**



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The Canadian engineer as a lawmaker

Trouble is he isn't — but community leaders say attitude must change

Alex MacDonald

Exclusive DE Feature

If this were a classified advertisement how many engineers in Canada would answer it? All of them? Not on your life. Half, perhaps? You are not even warm. Evidence is that only a handful, dotted here and there across the land, would be even remotely interested.

There are in fact about 33,000 professional engineers in Canada. Of these only .008 percent are members of the Federal Parliament and only .015 percent members of Provincial Legislatures. Turn to page 66 and you'll see the score. It is not impressive.

What are the reasons?

Not qualified? On the contrary, few are so well suited as the engineer for public service.

Not wanted? Wrong again. Premiers and mayors throughout the country only wish that there were more engineers in politics.

Not interested? This seems to be getting much closer to the truth.

It is quite true that there are a number of engineers serving on municipal councils. It has not been possible to assess just how many. Engineers are to be found, too, on voluntary committees of all kinds where their services receive high praise. No one could really accuse the engineers of completely lacking civic mindedness. But the fact still remains that in those areas of government where the laws are made the engineer is either notably absent or only barely represented.

The engineer as a potential politician

Let's take a look at the engineer as a potential politician. Just how suitable is he? Quite a number of people think him very suitable. Here's a sampling:

Dean R. R. McLaughlin, of the Engineering Faculty, University of Toronto, has this to say:

"I would say, without hesitation, that engineers are ideally suited to political work. They are people trained to look facts straight in the face."

Most people would agree that the country could use a few politicians who can do just that.

Here is the comment of the Hon. Leslie M. Frost, Premier of Ontario:

"I feel certain that professional engineers would have much to offer the political life of this country."

And this is what another politician told us:

". . . I do not hesitate to add that I have also found architects and engineers to possess a much deeper sense of integrity and honesty than unfortunately exists in some sections of our political leadership."

These are the words of R. John Pratt. He is not only a member of parliament but also mayor of Dorval, Quebec. As a professional man himself, an architect, he knows what he is talking about.

Now from A. W. Shackleford, Mayor of Lethbridge, Alberta:

"Their engineering background should enhance their

thinking and give them the right approach to problems related to municipal administration."

Educators say it. Politicians, at all levels, say it. The engineer, by his training, by his nature and by his character is fitted, as few others are, to the task of guiding this country. Any man can stand and point across the land at its wealth and rich promise. Few have the ability to bring that promise to fruition. But engineers are among those few. They know fact from romantic fiction; they can speak plain, without preamble. And — they are not interested.

"I would say," wrote the Hon. E. S. Spencer, who is an engineer and also Newfoundland's Minister of Finance, "professional engineers are generally disinterested in participating in public affairs."

"I have always been disappointed," says Dean McLaughlin, "at the lack of interest shown by engineers to participate in politics."

The Association attitude

Most startling is the indifferent attitude of the various Associations of Professional Engineers. The Canadian Council of Professional Engineers says: "The profession itself, through its association and societies, strongly urges its members to become more active in public life and recognizes the need for progress in this direction." But is this true? There are indications that the Council is deluding itself. The associations appear to be as disinterested en bloc as their members are individually.

There are eleven such associations in Canada and all were approached on this subject. *Of these eleven, three did not reply and of the remainder only two showed any interest at all.* Be it to the credit of the associations in Ontario and British Columbia that they were the two.

The situation, then, is abundantly clear. Engineers with much to offer, choose not to offer. And least concerned of all are the engineers.

Why pick on engineers?

But why pick on the engineers? Are they so special? They are indeed. Their suitable qualities have already been discussed, and be it understood that in any society the responsibility of its members is in direct ratio to the abilities of those members.

"As a forger of powerful economic weapons," says the Hon. T. C. Douglas, Premier of Saskatchewan, "the engineer has a definite duty and a professional obligation to assist in the control of these weapons."

In other words a man of ability cannot, in conscience, shirk his part in shaping the future of his country. But engineers do. Make no mistake about that—they do.

Reasons, or excuses, have been advanced for the engineer's indifference to public affairs. Granted some are specious but some are downright examples of defeatism. Here's a selection:

Engineers have a distaste for the rigmarole of politics. For instance: "they consider many of the practices involved (in electioneering) childish." They dislike long-winded political procedure; the small value politicians place on time, particularly other people's time; the verbose approach many make to simple matters. No sane person would deny that these are objectionable. But there is surely no justification for turning a superior back on the scene. Many a politician has been punctured and ingloriously deflated by the sharp barb of a brief accuracy. Cynics notwithstanding, reason does have a habit of prevailing.

Some quotes on the subject

"The relative dearth of engineers, or men with engineering training, in the public life of Canada is a serious problem and one that will become more serious as time goes on.

". . . today the really major problems of government, at all levels, are either technical in nature or are influenced by technological developments.

"As a forger of powerful economic weapons, the engineer has a definite duty and a professional obligation to assist in the control of these weapons."

The Hon. T. C. Douglas, Premier of Saskatchewan.

". . . I would like to say that my experience has led me to believe in the absolute necessity of more architects and engineers taking on public work for the great benefit which their technical training may bring to the community at large."

R. John Pratt, M.P., Mayor of the City of Dorval.

". . . having some engineering talent on our council helps us to take an objective approach to any problems raised in our public works department, and also to question and get the right answers from our consultants on engineering projects.

". . . I can assure you that in Fort Garry the two engineers who have served on our council have been a tremendous asset to the municipal government."

R. D. Chase, Mayor, Rural Municipality of Fort Garry, Man.

"We engineers and scientists must not shirk our share of responsibility simply by disappearing into the research laboratory, the design office and the factory and busying ourselves with our technology. We must accept, as foremost citizens, a part of the responsibility for grappling with the far larger and vastly more complex social problems with which we, and all people around us, are confronted."

Dr. K. F. Tupper O.B.E., P.Eng., Toronto

continued ▶

Engineers do a great deal of contract work for governments. The suggestion here is that embarrassing situations could arise if engineers were also politically active. Quite true, they could arise—if they were allowed to. But a person of integrity is surely unlikely to find himself in such situations. And it is a very poor man indeed who refuses to act according to his beliefs because he fears misinterpretation of those acts.

Engineers suffer a financial loss when they enter public life. For some this is undoubtedly true and it becomes a very personal matter that is hard to criticize. But it is certainly not true for the majority of engineers. Members of Federal Parliament receive an annual indemnity of $8,000 plus tax-free expenses of $2,000. Provincial indemnities vary from province to province, but they are usually adequate. Highest is Quebec — $6,000, including expenses, per session. Lowest is Prince Edward Island — $1,950, including expenses. In addition some provinces increase the indemnity for extended sessions. Sessions rarely exceed three months in a year, in most provinces they are much shorter, and many members continue working at their professions.

Engineers jeopardize their jobs and professional careers by active interest in public affairs. Sadly enough this is too often the case. In fact there are recorded instances of large corporations openly voicing disapproval of employees who show an interest in public life. Take a young engineer, married perhaps with a small family, who wishes to campaign for election. He needs time, so he must resign his position. "All praise to this young man," people say. But if he is defeated, what do they say then? Chances are he'll get his job back—if he asks nicely. No doubt he thinks the humiliation fine reward for his efforts.

Even if he is elected he is entering into a notably capricious field. Four or five years later, when seeking re-election, he may very well be defeated. What then? Will a seat in the house make him a better design engineer? Employers may well ask.

Luckily attitudes in business and industry are changing. Reports are that an increasing number of large corporations are setting a firm policy whereby an employee may stand for elective office without jeopardizing his future with the company. One suggestion is that a man take leave of absence until the election. If he is successful, he resigns; if not, he returns to his job.

Even more generous in scope is a plan announced by the Ford Motor Company, of the United States. This plan not only allows a candidate for public office to take leave of absence for the purposes of his campaign, it goes an important step further. If defeated he returns to his job but, more significantly, if he is successful his leave of absence will be continued until he retires or is defeated at a later election. He will then return to the company without any loss of benefits, pension or retirement plan provisions.

Engineer's training is too specialized compared with, say, lawyers. There's an element of truth in this too, but not enough to make a worthwhile argument. At Toronto University's Department of Engineering a compulsory six percent of the curriculum is given over to humanistic social studies. This includes such subjects as history, political science and economics, and represents a fair average for the universities across the country. This may not be a considerable proportion. But no man ever graduated from any course, at any university, fully equipped to face life. In this case wide reading and a lively interest in current affairs seems to be the answer.

What's in the future?

What does the future hold? Will the engineers' indifference remain? Or will they look about them, with a growing realization of their responsibilities, and know that their duty lies on the hustings as well as in the drawing office; in the legislative assemblies as well as in the factories?

Let's face an undeniable fact: The ultimate welfare of this nation is involved, and the situation must change. One man who thinks so is Dean McLaughlin.

"In the future," he says, "I feel that this situation will have to change. Government is becoming more and more complex. It will need practical guidance lest it becomes lost in the mere intricacies of policy making. I believe that the nature of the engineer is such that he is the man who can best do the job."

To bring about this change, encouragement must come from many sources: a stronger emphasis on the social aspects of life in the universities' curricula; greater interest from the professional associations; more encouragement and sympathy from employers, particularly along the lines of the Ford plan. But finally the decision rests with the engineer—and with his conscience.

Perhaps it will stir that conscience if the last word is left to Dr. Desmond Kidd. A professional engineer, a successful Vancouver mining geologist, he has, throughout his career, accepted fully his civic responsibilities. Here is what he says:

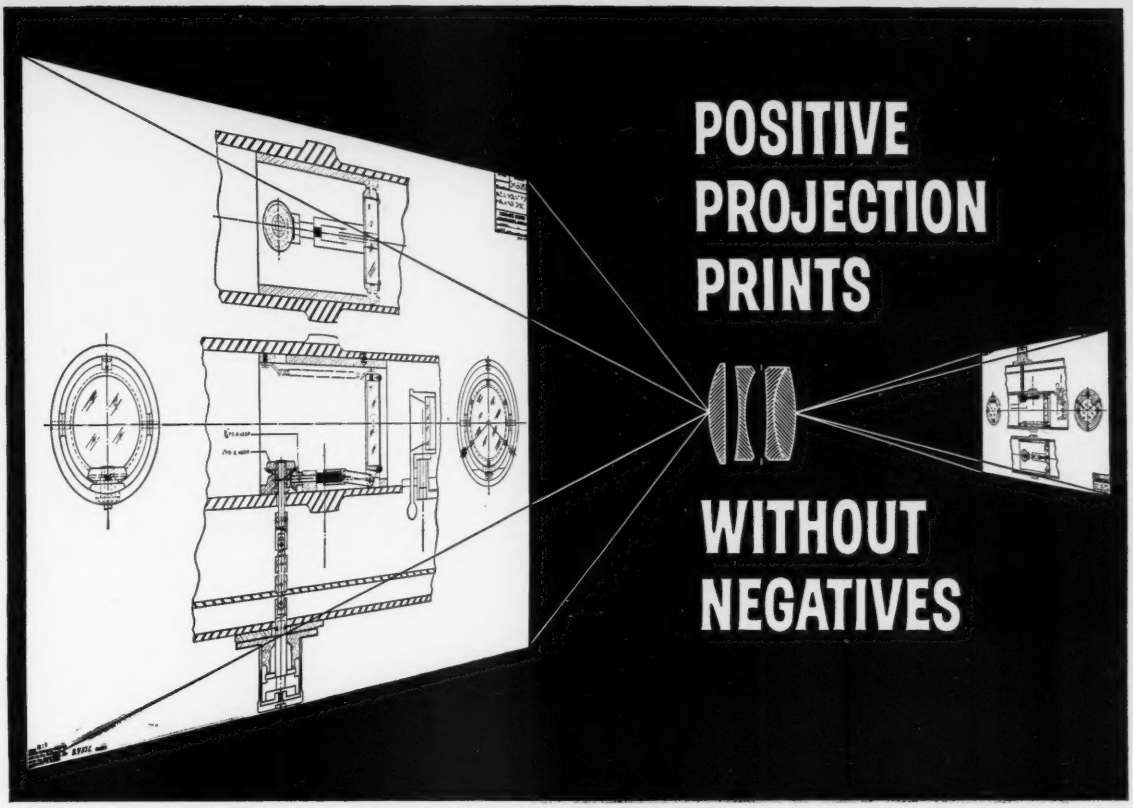
". . . I often say I should have my head examined for taking a hand in it (public life). There is hard work. There may well be abuse and character smearing attempts. There is no money, rather expense. But if you succeed in serving the public in some way, there may be love from some, and one can live with oneself for doing a true public service job, and that is an engineering ideal." ★

HERE'S THE SCORE

Elected positions held by Professional Engineers

Province	Provincial Parliament	Federal Government	Association Members
British Columbia	1	..	2213
Alberta	..	..	2348
Saskatchewan	1	..	629
Manitoba	1	..	964
Ontario	..	..	17604
Quebec	1	3	7757
Prince Edward Island	..	..	27
New Brunswick	..	..	405
Nova Scotia	..	..	542
Newfoundland	1	..	136
Totals	5	3	32625

In addition, there is one Professional Engineer in the Senate.



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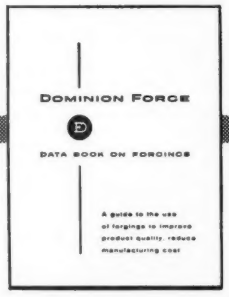

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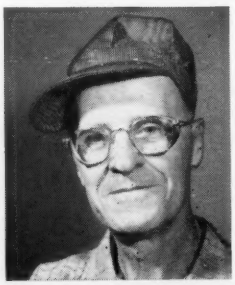

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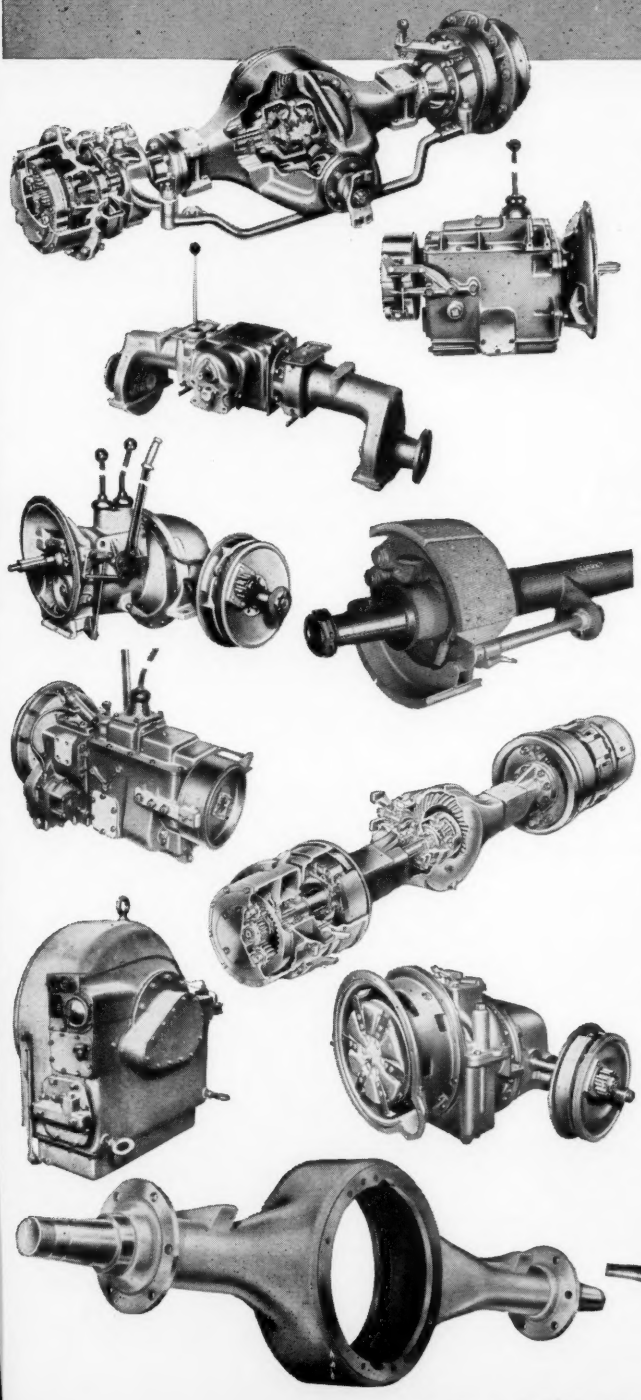

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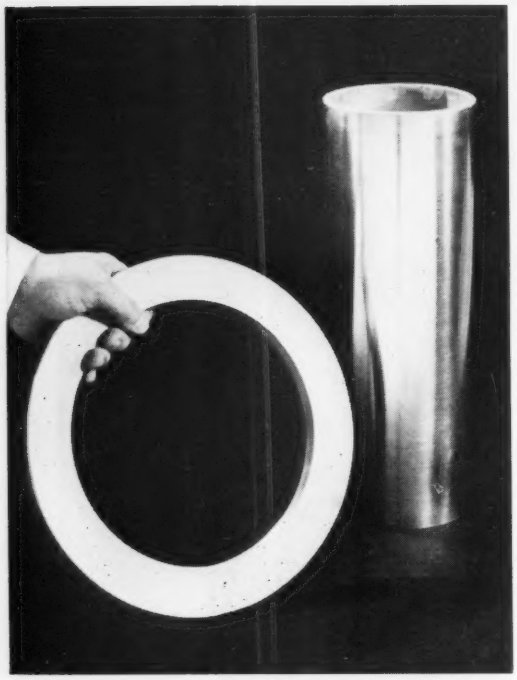
Ideas round-up

Porous nickel comes in intricate shapes



A pressed and sintered porous nickel, capable of operating at temperatures to 575 F, is being produced in large and intricate shapes.

Called Cormet A, the material is fabricated by a new process into sheets 12 by 30 inches, as well as cylinders two feet in length, with 12-inch diameters. Large sizes are made possible by new hydrostatic pressing process.

The material can be used as a noncontacting conveyor when processing extrasensitive materials such as camera and X-ray film, gelatinized paper, adhesive materials, plastics and products that have high surface sensitivity at elevated temperatures.

Products ride on a thin cushion of air forced through the pores of the material.

Depending on porosity, yield strengths will go up to 10,000 psi. Maximum thickness of available pieces is one inch, although thicker pieces can be made, the company stated. Fine orifice holes (0.012 inch) for burner plates can be drilled through as much as 5/8-inch thickness, using conventional metalworking machinery.

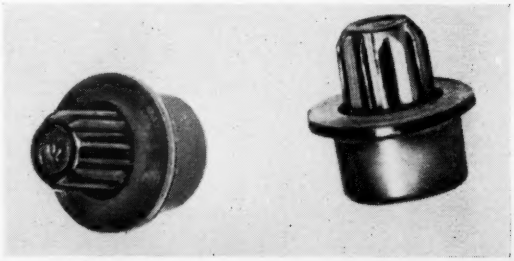
The surface of Cormet A can be machined by a special process to a high polish with no effect on permeability. With smooth surfaces, the material can be used as a fixed contact roller in high-speed machinery. Vacuum applied to the product through Cormet A roller can hold the product securely the moment machinery stops, preventing inertia rolling or backlash. *Source—Corning Glass Works.* **308**

Self-fastening lock features molded flutes

A new self-fastening principle now makes instantaneous insertion and locking possible for a wide variety of plastic parts. Applications to date include electrical standoff and feed-through terminals, drawer glides, casters, antifrictional bearings, cable support clamps and tip jacks. The design eliminates the need for threads, nuts, lockwashers and other fastening hardware and provides exceptional holding power for the size of the part involved.

The parts are simply pushed into place through a punched or drilled hole by means of a drill press, arbor press or simple hand tools. This time-saving feature greatly reduces labor costs. And since the one-step, one-piece, self-fastening design reduces inventories and simplifies production, over-all part installation costs are held to an absolute minimum.

The patented "Pushlock" feature consists of a series of molded flutes extending radially from a plastic stud. When the stud is pressed into a hole of proper size, the flutes deflect and their tendency to return to their original position creates a firm outward pressure—exerted uniformly around the entire inside circumference of the hole. Parts align perfectly and resist loosening even under severe shock and vibration conditions, in either wood or metal. Since they do not require nuts or washers, they eliminate problems encountered in blind spots and hard-to-get-at locations. *Source—Whitso, Inc.* **309**



continued ▶

Veeder-Root READOUT Bulletin

One of a Series

Predetermining Counters provide simplified methods for Automatic Control

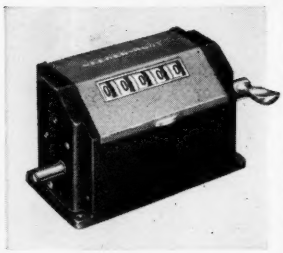
Veeder-Root Predetermining Counters now make it possible to design and build automatic control into equipment of all types. They are available for mechanical, electrical and electronic control and offer many features and options to give your equipment extra value and versatility.

Predetermining Mechanical Counters can be applied to rotary, eccentric or stroke type motion, registering or counting whatever units are required — such as revolutions, motions, turns, pieces, lengths, and strokes. The newer electric and electronic Predetermining Counters use a special high speed light source and photo cell for non-contact counting on any machine or process.

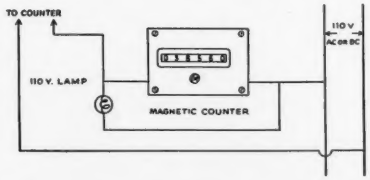
Automatic control is provided by the predetermining counter actuating such devices as: lights, bells, signals and stop motions. They work at speeds up to 8000 counts per minute, can be easily incorporated into machine design and control panels. Application assistance is available from a Veeder-Root Counting Engineer; and specialized designs and modifications can be supplied in most cases. For complete information, call or write your nearest Veeder-Root office.

The High Speed Predetermining Counter is the basic counter in this complete line. It provides automatic control by this simplified method: . . . to set a run of 5451 pieces on the counter: (1) Set all white wheels to zero with one turn of wing-nut; (2) Now, set the metal wheels, one by one. Set first wheel to "5", opposite zero on its "opposite number" white wheel, then set the "4", "5" and "1" and that's all . . . you're ready to throw the switch and start the run.

High Speed, Quick Reset Predetermining Counters for electrical and mechanical control, at speeds to 8000 cpm.



This counter has one set of wheels which are preset to any figure within the capacity of the counter by depressing the reset lever, raising the cover, and turning. The counter subtracts from the preset number to "00000", when a knock-off lever actuates an electrical switch. To reset, just press the reset lever, and counter returns instantly to preset figure. For Mechanical Control, counter actuates a mechanical lever instead of electrical switch. Speeds: 6000 rpm or 8000 counts per minute.



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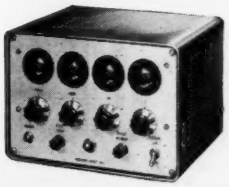
This new counter offers automatic reset plus other important features: **1.** Instant automatic reset . . . *Control* contacts operate and hold for 0.3 seconds . . . or for 2 seconds . . . or indefinitely. **2.** Counter can be modified for automatic sequential predetermining, using two or more preset numbers. **3.** A batch or totalizing counter can be added. This counter is adaptable to material handling applications, slow speed batch counting, length measurement, slitting, and similar applications. Speeds up to 1000 cpm.

High Speed Electronic Predetermining Counters Feature Automatic Reset, 5000 cps.



The No. 1604 features instantaneous recycling. Up to six decade counters, with one, two, or more sets of preset numbers . . . with or without photohead or enclosure. Output relay provides momentary or indefinite holding time. Batch totalizing available. Ideal for all high speed counting, up to 5000 cps, recycle at 1000 cps.

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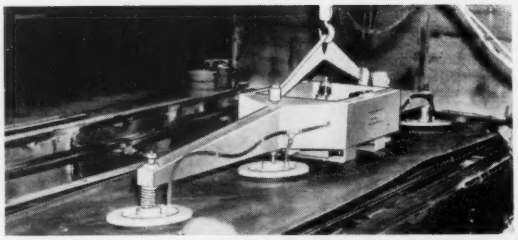
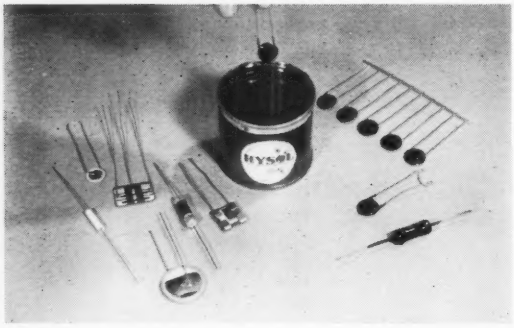
Low-cost vacuum handling unit



Shown here is a new, standard, low-cost handling unit used for transferring steel plate from stock stack to welding jig. Consisting of a 4-pad arrangement, this vacuum handling unit has many possible applications; such as feeding, stacking, conveying, etc.

While the vacuum handling principle is not necessarily new, it has only been in recent years that many varied industries have realized the versatility as well as the tremendous safety and labor-saving advantages of this process. *Source—Vac-U-Lift Company.* **310**

Epoxy compound for small electrical parts



A new epoxy compound has been developed for encapsulating, by dipping, small electrical components such as ceramic wafer capacitors, resistors and small transformers. Identified as HYSOL 10-80, the black thixotropic material produces an even nondripping coat on pieces up to one-inch cube.

Since HYSOL 86-10 is truly thixotropic, the mixture is quite viscous. However, when some relative motion is produced between the system and the part being dipped, the viscosity at the part reduces sharply so that the compound can flow evenly over the part. On withdrawal, the viscosity rises so that no dripping occurs, even at cure temperatures as high as 160 deg. C. *Source—Houghton Laboratories.* **311**

High-capacity V-belts save weight and space

A completely new line of V-belt drives, features smaller and lighter sheaves and V-belts of higher capacity at substantially lower cost.

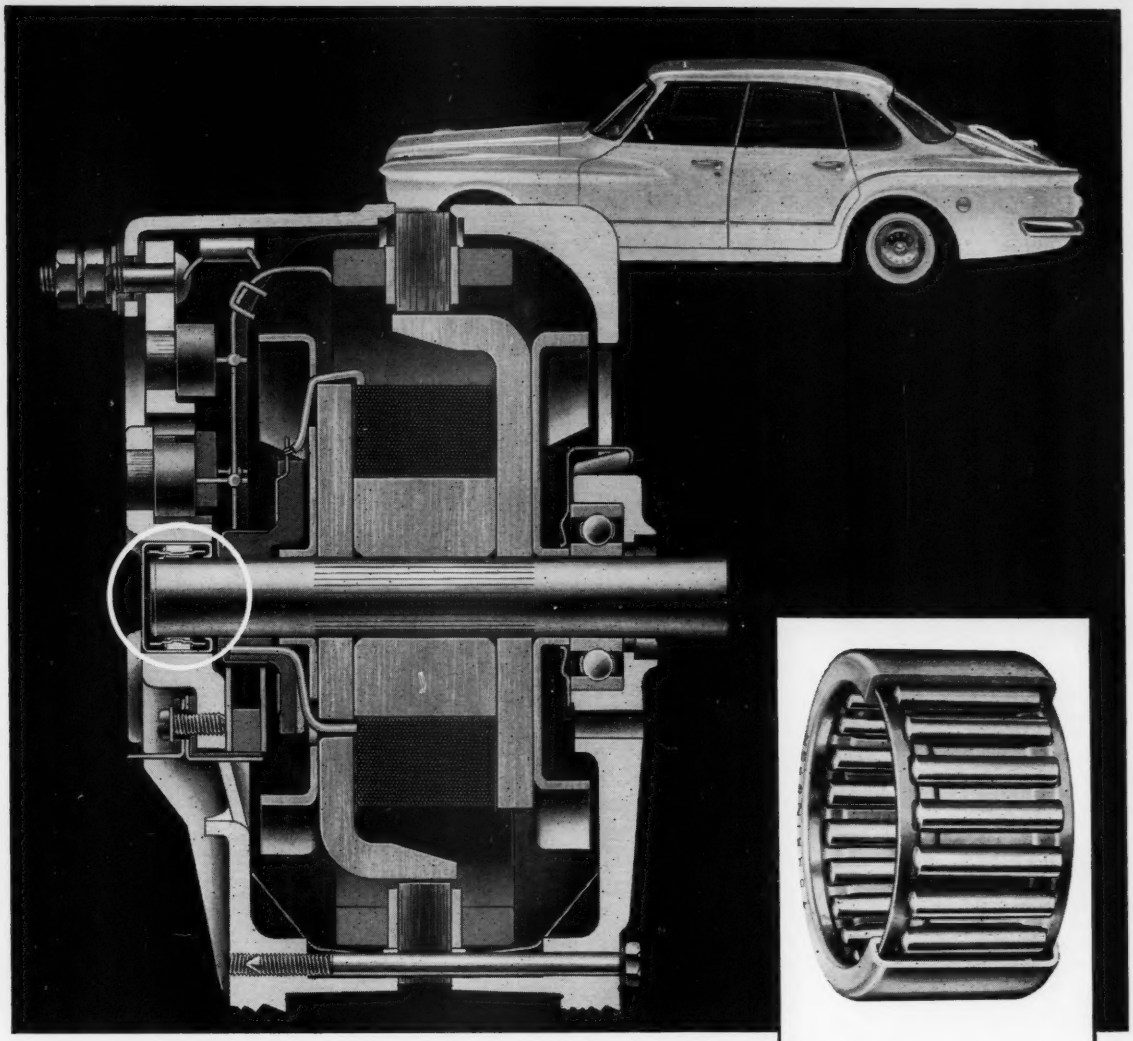
Introduced under the trade name Dyna-V, the new line of drives covers the complete range of horsepower capacities available in conventional drives. Savings in space, weight and cost are made possible by scientific advances in developing stronger metals for sheaves, and synthetic rubbers and fibers for belts.

With the new Dyna-V line, the majority of industrial drives can be handled with belts only ⅜ inch wide, and sheaves that are greatly reduced in both width and outside diameter.

Economy of space is a vital factor in machine design. These new drives will offer the design engineer unprecedented opportunities for saving space and cutting costs in power transmission. Smaller and lighter sheaves also tend to prolong bearing life.

Dyna-V drives are being offered in two standard groove sizes to meet all except the largest industrial requirements. Besides the ⅜-inch (nominal top width) size, known as 3V, the company is manufacturing a 5V, or ⅝-inch size for higher horsepowers. Sheaves in the 3V series, from one to 10 grooves, are designed for drives ranging from one to 50 horsepower. The 5V series will include sheaves to take from three to 10 of the ⅝-inch belts, and will handle drives up to 200 horsepower. *Source—United Steel Corporation* **312**

continued ▶



Torrington Drawn Cup Roller Bearings Used in Valiant's Alternator

Compactness, efficiency, economy, reliability . . . these are outstanding features of Chrysler Corporation's exciting new small car . . . and of Torrington Drawn Cup Roller Bearings. Used by Chrysler in the Valiant's new alternator system for electrical power generation, these bearings provide smooth, trouble-free operation and long service life without need for relubrication.

Torrington Drawn Cup Roller Bearings offer performance advantages in all types of generators and appliance motors. The cost is remarkably low . . . in many cases, armature bearing costs have been lowered by as much as 50%. For advice on the application of Torrington Drawn Cup Roller Bearings to your specific problems, call or write: **The Torrington Company, Limited, 925 Millwood Road, Toronto 2, Ont.**

Armature-mounted Torrington Drawn Cup Roller Bearings offer these outstanding advantages:

- Highly efficient roller guidance
- Ample provision for lubricant storage and circulation
- High capacity in small cross section
- Long pre-greased service life
- Outstanding efficiency at high speeds
- Easy mounting by press fit
- Simple housing design
- Low unit cost

TORRINGTON BEARINGS

Every Basic Type of Anti-friction Bearing

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • BALL • NEEDLE ROLLERS • THRUST

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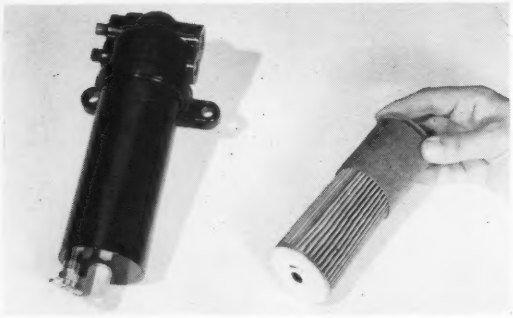
Pleated filter keeps air lines clean



A filter element that effectively removes dirt, water and oil from factory air lines is now available. The unit was specially developed for precision gauge applications where positive removal of the contaminants is a basic requirement.

The filter assembly, as shown, consists of an aluminum filter head that houses inlet and outlet ports, a chemically coated aluminum bowl with a drain cock and a filter element. Standard pipe threaded parts allow versatile mounting of the assembly.

The filter element is a pleated, phenolic resin impregnated cellulose cylinder with a deflector baffle around the top. Rated at ten microns, it is highly efficient. *Source—Aviation Electric Limited.* **313**

Revolving handles

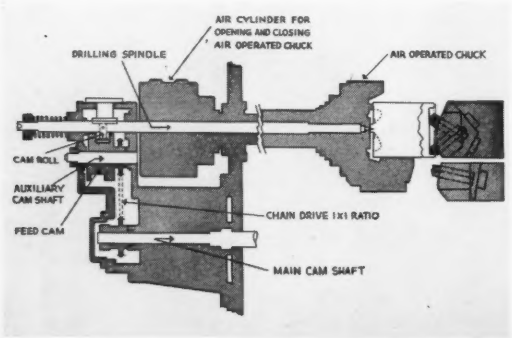
Revolving handles that attach to handwheels to simplify turning are now being produced.

The handles, made of aluminum, feature an extra long bearing surface to eliminate much of the turning friction, reduce wear and provide additional strength. As the handwheel is turned, the revolving handle grip spins on a steel stud attached at right angles to the handwheel.

Handle is attached by inserting stud at convenient location on wheel and slipping handle grip over stud. Locking ring assures positive fit. Handle can be removed and reassembled as often as desired. *Source—Jergens Tool Specialty Company.* **314**

Tooling idea saves operation in piston drilling

A unique tooling setup eliminated a separate operation by centre drilling aluminum pistons through the spindle while they are being bored, faced, turned and chamfered. Perfect alignment of centre drilling skirt boring is assured because both operations are done simultaneously in a single holder. The aluminum pistons are used in light-weight, high-speed diesel engines.



Automatic centre drilling is a part of the first operation on the aluminum casting. The complete operation includes centre drilling the dome and, rough boring, finish boring, facing and finishing.

The centre drilling operation is accomplished by having a cam-driven, spring-loaded drilling spindle connected directly to the main camshaft of the lathe. The centre drilling spindle is in a retracted position when the piston casting is mounted in the chuck. As soon as the main camshaft is engaged to begin machining operations, its rotation is transmitted through a 1 x 1 ratio chain drive to the auxiliary camshaft. The rotation of the auxiliary camshaft is translated into linear motion by using a cam roller in the feed cam groove. The cam roller is keyed into the drilling spindle shaft. As the feed cam turns, the roller forces the drilling spindle forward thus machining a centre in the piston dome. The drilling spindle is keyed to prevent rotation. When the centring operation is complete the tooling is automatically disengaged and forced to retract by spring action. *Source—Seneca Falls Machine Company.* **315** ★

Some Ideas

for your file of practical information on drafting and reproduction from

KEUFFEL & ESSER CO.

Frankly, we hope you're a fusspot. If you are fussy about the way you work, and proud of it, we think you'll enjoy knowing about three K&E items which reduce the effort required to get pin-neat results. Our first suggestion is . . .

A Better "Mattress" for Your Drawing Board

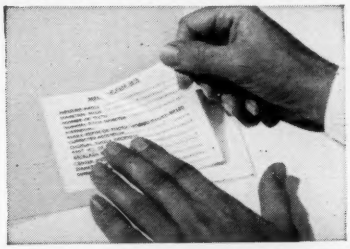
For effortless drafting, a good board cover is about as important as a good mattress is for sound sleep. Which is why so many draftsmen swear by LAMINENE® (N 70), the only *laminated* board cover material made. An exclusive, patented K&E process gives LAMINENE several very practical advantages over plastic coated papers. You can stretch it, drumhead-tight, over your board. All you do is wet the back, then secure the ends by taping or stapling to the underside of the board. After drying, LAMINENE grips the board as if cemented—there's no rippling, no stretching with the weather, no slack to take up. Its "drafting feel" is perfect: just the right balance of firmness and resiliency. LAMINENE'S non-glare surface makes it easier on the eyes, too, even under fluorescent lighting. You can expect to leave the board feeling fresher, even after a long day.

What's more, LAMINENE won't crack or scar like a plastic coating. Its laminated film surface is flexible, and stays that way—no crevices form to pick up workaday grime. It's easier to clean, too. A little soap and water is all it takes to keep LAMINENE looking like new.

LAMINENE is available in White or Eye-Ease Green; plain or with 4 x 4, 8 x 8 and 10 x 10 grids to the inch, which act as permanent two-way tracing guides. A free sample can be yours in a few days if you write us today. If you've never tried a laminated board cover, we promise you a new experience!

Stickers With Delayed Action

Want to eliminate a time-consuming chore? You can cut down on tedious repetitive lettering by having title blocks, specifications, and other symbols or legends printed



—clearly and sharply—on DULSEAL$^{T.M.}$ (74). This tissue-thin film has a delayed-action adhesive on the back, and a dull-finish face for easy writing or printing. Stickers made of Dulseal can be firmly positioned—and re-positioned hours later, just as firmly. The adhesive takes 24 hours to set. Once it does set, a permanent bond is formed with the paper or cloth beneath. Dulseal is chemically stable, and the adhesive will not bleed, even in hot copying machines.

Repeated erasures on Dulseal will not affect its "take." Produced by an exclusive process, the "tooth" is *built into* the surface. Transparent and low in reflectivity, Dulseal stickers will not affect the transparency or printing speed of your drafting medium. K&E supplies Dulseal in sheets, rolls (printed to your specifications if you wish), and as a mending tape in a handy dispenser. Try a sample, on us!

3 To Keep Clean

Best way to keep your tracings clean: don't let them get dirty. A mighty easy way to achieve this is to sprinkle the tracing lightly with gum eraser particles, while working. Then, triangles, T-squares, and scales stay clean, and clean the surface *automatically*, as they are moved back and forth. The particles will not dry out or harden—they contain no grit or abrasives. They'll actually improve the ink taking qualities of your drafting surface.

For this purpose, K&E supplies cleaning particles put up in three different ways. We think the new plastic squeeze-bottle (3036C) is the handiest of all. The shaker-top can (3036) has also been a drafting-room favorite for some time. And, for double-duty cleaning, we suggest the ABC Dry-Clean Pad$^{T.M.}$ (3037), which holds slightly coarser granules that sift through soft mesh. The ABC Pad also comes in handy for wiping a complete tracing after it is finished, or for preparing certain surfaces for ink work. Or for an overall pre-cleaning, since the best way to insure clean tracings is never to let soil build up.

The proverbial ounce of prevention is worth the traditional pound of cure!

These K&E products, and others that can make life easier for you, are available from your nearby K&E dealer. See him soon . . . or send us the coupon below for further information and samples.

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Please send me samples of LAMINENE® Drawing Board Surface Material, and DULSEAL$^{T.M.}$ Tape . . . plus information on K&E cleaning powders.

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New CSA Publications

The following four new publications of the Canadian Standards Association are of special interest to all designers.

CSA C41.1-1959. Guide for the Preparation of Test Procedures for the Thermal Evaluation of Electrical Insulating Materials (Adoption of AIEE Standard No. 1D-1957).

The purpose of this Guide is to establish principles for the development of test procedures for the thermal evaluation of electrical insulating materials and simple combinations of materials used in rotating electric machines, transformers, and other types of electric equipment. *Price: 25c per copy.*

CSA C41.2-1959. Guide for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electric Equipment (Adoption of AIEE Standard No. 1E-1957).

The purpose of this Guide is to provide a general form for the preparation of systems test procedures, and to suggest the points to be considered in the preparation of specific instructions for the thermal evaluation of insulation systems for equipment. *Price: 25c per copy.*

CSA C41.3-1959. Statistical Analysis of Test Data (Adoption of AIEE Standard No. 1F-1958).

After life data has been obtained at different temperatures from accelerated life tests, the problem is to evaluate the resultant data so that the life expectancy of insulation can be estimated. For this purpose, life expectancy is considered as a function of temperature. This Special Publication outlines the statistical procedures by which the most probable form of this relationship, and its reliability, are determined. *Price: 25c per copy.*

CSA C22.2 No. 121-1959—Electric Heating Equipment for Medical and Dental Use. (First Edition):

This is the first edition of No. 121 of a series of Specifications issued under Part II of the Canadian Electrical Code. It applies to both portable and stationary electric heating equipment for medical and dental applications for potentials of 250 volts and less, designed to be used in ordinary (i.e., non-hazardous) locations in accordance with the Canadian Electrical Code, Part I.

This Specification applies to equipment such as sterilizers, inhalators, bottle warmers (professional type), infant incubators, therapeutic lamps (infrared and ultraviolet), perineal heaters, bed tent warmers compound heaters, dental furnaces, normal frequency cauterizers, heated chairs, carbon-arc lamps, and heated massaging devices. *Price: $1.50 per copy.*

Briefs

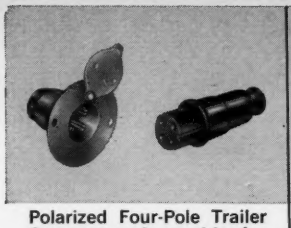
We note with interest . . .

Aluminum extrusions snapped together form part of the first conclusive answer to outdoor switchgear housing corrosion problems, we are told . . . **a stacking chair** designed by Orr Associates, industrial designers of Toronto, was shown in Stockholm recently at International Council of Societies of Industrial Designers exhibit . . . **take your pick:** a press release from A.S.M.E. indicates that tires of the future may be filled with urethane foam; others will be made entirely of wire (punctures will be a nightmare of steel shavings?) . . . **five second test:** guess the meaning of bauxilum, cupralum, ferrolum and nicrolum. No luck? They are the four basic Insmetals (International Shielding Metals), lead shields which guard against gamma radiation — are formed by metallurgically bonding base metal with lead. Thus bauxilum is lead clad aluminum; cupralum, lead clad copper; ferrolum, lead clad carbon steel and nicrolum, lead clad stainless steel . . . **hot work in hand:** two men at the University of Florida are developing an air conditioning unit that uses the sun's heat for power (fry the bacon over the ductwork Martha) . . . **our government** is spending $6 million this year on oceanography. In March the largest scientific expedition ever sponsored by a Canadian government, will leave for the Polar Continental Shelf. At least it's good to know where some of our submerged tax money is going . . . **a Canadian company** is developing an airborne gravity gradient measuring instrument that should help geologists, geodesists and atomic scientists: full development will take two years . . . **now that we have** the power handle in our midst (you know the basic unit that attaches to a variety of tools with a "flick of the wrist"), we hope the insurance companies are dreaming up "floater policies" to cover the results of mother trying to polish the furniture with a 3 hp sander . . . **Nova Scotia** fisherman have been testing different colored nets in an effort to catch more fish. The results? Find a place where there's fish then use any colored net you want—salt water fish aren't color conscious . . . **a star** at the recent Radio Show in London — hanging wall tv . . . **medical researchers** have unravelled the complicated life history of a virus so small that more than 100 of them can live in the interior of a bacterium . . . **a new lightweight** 500 hp

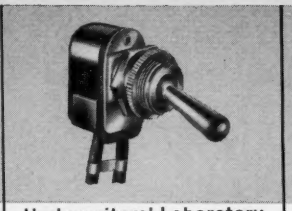
(Continued on page 78)

Briefs *Continued from page 77*

turbo-prop aero engine — the PT6 — features easy maintenance, lower engine noise level, high savings in production costs by standardization . . . **In Scotland** one football field is kept in top playing shape during winter months by being warmed with electricity. Wires are buried six inches deep and six inches apart from one end of the field to the other and controlled with a thermostat . . . **a Vienna-born** woman dentist has developed a torsion bar which connects partial dentures and helps distribute stresses evenly through combined set of natural and false teeth . . . **lack of sound** can drive a man crazy, experiments show. We can think of several tv commercials that drive us crazy with or without sound . . . **even big feet are** going out of fashion: earth-packing machines in 40-ton size are now being operated by push-button control. Its hundreds of flat steel feet grind layers of dirt to hardness . . . **the American** Welding Society invites authors to submit papers on welding or related subjects for presentation at its National fall Meeting—September 26 in Pittsburgh . . . **did you know** that Canada has lead all other countries in the production of nickel since 1905? . . . **ready soon:** a car-plane produced by an ex-A. V. Roe group of engineers . . . **a safety swimming** aid consists of a lifebelt hidden in the swim suit: it's connected to a pressurized cartridge and inflates in an emergency. We wonder if it works for people in hot water . . . **how many hard-working** engineers got an electric manicure machine for Christmas? An ad we saw said that such a machine was "designed to automatically, trim, taper and shape the nails . . . remove cuticule and dry skin, manicure nails to professional-looking beauty in minutes. Also pedicures toenails." We'd have bought one—but it didn't have a varnish attachment . . . **do you suffer** from coccygodynia? If you do here's a tip — cut down on your tv-watching. Disease is "tv-bottom" in short—is got by watching tv too long . . . **seamless vanadium** tubing should be valuable in the nuclear and process industries because of light weight, high temperature strength and corrosion resistance . . . **is there a trend** toward single-control machines? Some time ago we reported on a tractor with single controls; since then have seen several others . . . **a retired** U. S. engineer has invented a device to reduce smog-producing hydrocarbons exhausted from auto engines. It uses miniature cylinders inside the regular cylinders to promote better burning of gas . . . **we hear that** the world's first A.S.T. municipal sewage treatment plant at Beaconsfield, Que., is creating world wide interest. Atomized Suspension Technique is used (sewage is sprayed into the top of a tall tower whose walls are kept at high temperatures) . . . **Brief Talepiece:** Engineering science to the rescue: a new cosmetic in the U. S. is named "Lady Chatterley's Instant Sex." It's a heavy oriental-type perfume packaged in an aerosol can. ★

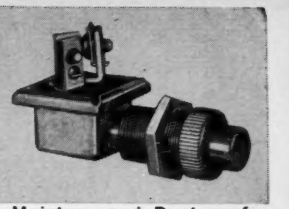


Polarized Four-Pole Trailer Connector Assembly for Passenger Cars.



Underwriters' Laboratory Approved Toggle Switches With or Without Wire Leads.

Complete Electrical Control Switch Panel for Electric Starting Requirements.



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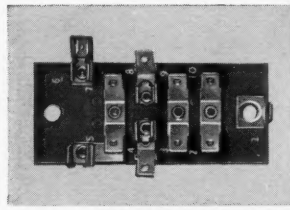
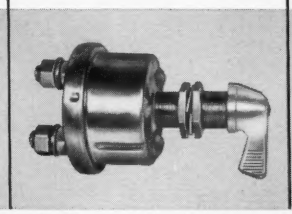
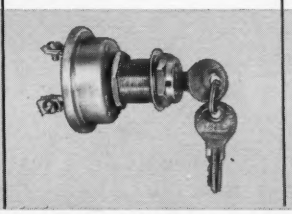


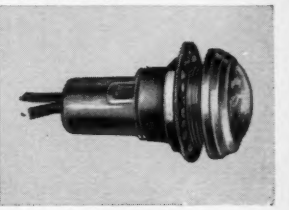
Battery Master Disconnect Switches. Single and Double-Pole Versions.



Combination Ignition Starter Switches With Coded Tumbler Lock and Keys.



Pilot Lamps — Gasketed, Waterproof With Clear or Red Faceted Lenses. Single or Double Contact. 6, 12 or 28 volts.



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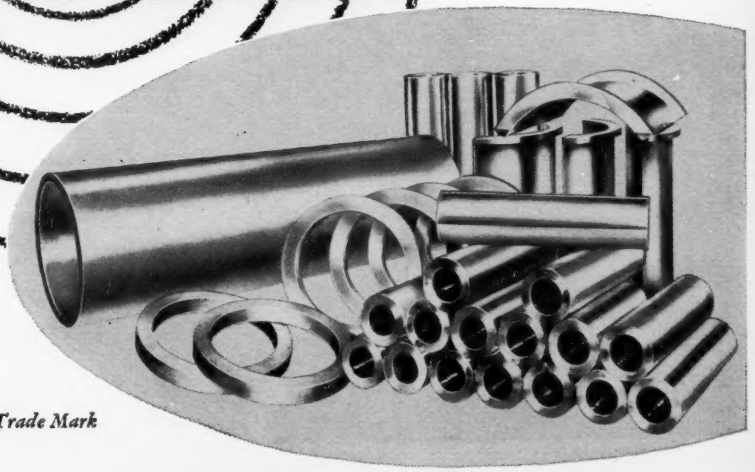

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People in the news

William McNair has been appointed general manager of a new company, Aluminum Shapes Ltd., Toronto. Firm plans to provide a fast delivery service of aluminum alloy extrusions from stock. McNair is a P.Eng., was previously with the Kennetrack Division of Ekco Products of Canada.

Robert R. Bogaert has been appointed vp and general manager of Canadian Halco Industrial and Mining Co. Ltd., of Dixie, Ont. New company will handle sales and service of Halifax Tool Co. products.

★ ★ ★

New assistant manager plant operations of Products Tank Car Shops Ltd., is **Victor G. Tanner.**

★ ★ ★

A new plastics division has been formed by Rohm and Haas Ltd. **J .W. Robinson** has been named manager; **A. T. Orr** will handle sales development.

McNair

Simmons

Dwight S. Simmons of Toronto has been elected president of the Association of Professional Engineers of Ontario. Simmons is general manager of manufacturing for Imperial Oil Ltd. He succeeds **A. W. F. McQueen** of Niagara Falls, Ont. Directors of Peabody Engineering Corporation of Canada, a newly formed company are: **E. G. Peterson,** president; **John Dunn,** vp; **R. C. Vroom,** treasurer. Company is subsidiary of parent organization of same name in U. S. — manufacturers of oil, gas, coal-burning equipment.

★ ★ ★

Allison F. Mosher is to establish an Ontario branch of Philip French Sales Ltd., distributors of precision bearings, gears and instrument components. Mosher is an engineering graduate of the University of British Columbia, and holds a master's degree in business administration.

★ ★ ★

Pym

Rodenburgh

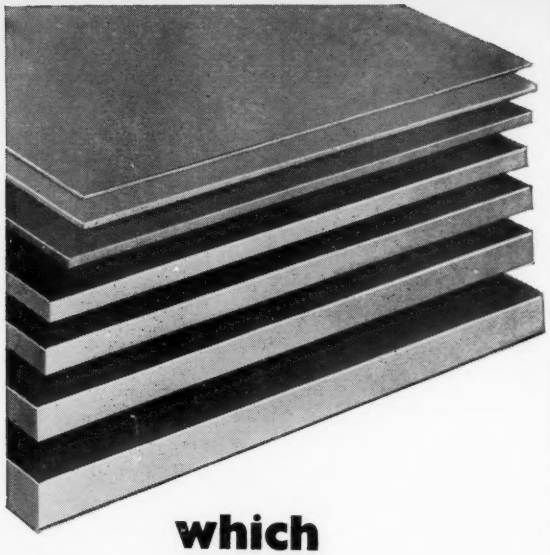
J. A. Pym has been appointed to Plastics section manager in the development department of Naugatuck Chemicals. **Douglas G. Rodenburg** heads the same company's technical service on rubber chemicals.

★ ★ ★

J. A. Cross has been appointed group general manager of a group of six companies, and **J. E. Conner** assumes a similar position with a group of structural steel companies. Both appointments were announced by Canada Iron Foundries Ltd.

★ ★ ★

New director of British Oxygen Canada Ltd., is **Clarence McLeod Pitts.** Mr. Pitts is president of People's Gas Supply Co. Ltd., Ottawa. He is a member of the APEO and also a life member of the EIC.



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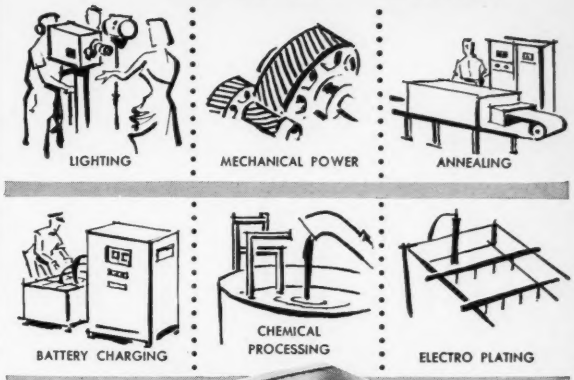

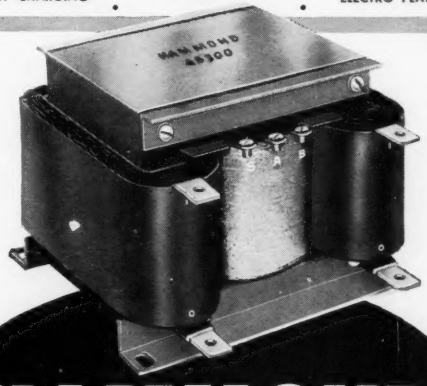

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Hammond Saturable Core Reactors will control large A.C. powers with small amounts of D.C. Current. They are highly efficient, completely reliable and require no maintenance.

Available in all sizes, from milliwatt level to 50 kilowatts, and for all commercial power frequencies including 400 cycle. A typical Hammond Saturable Reactor, when connected in series with a load, will vary the load voltage from 10% to 95% of line voltage. The D.C. power requirements are generally 2% of the controlled power. The Reactor may be remotely controlled by a small potentiometer.

Saturable reactors are not expensive and have numerous varied applications throughout industry.

Write for Bulletin 5057.

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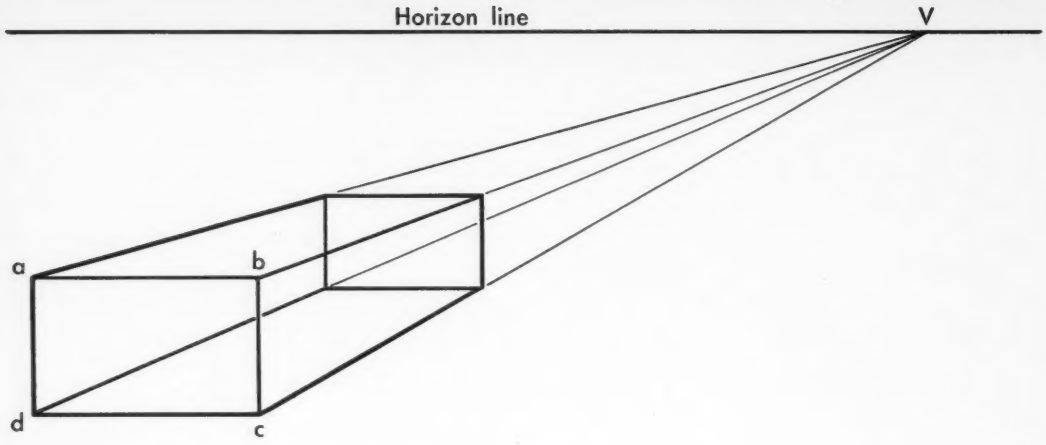

Perspective projection simplified

How to make perspective drawings look like photographs. Certain new principles may outdate the use of special mechanical aids, says engineer

W. H. Sheppard, B.Sc.(Eng.)

Exclusive DE Feature

In recent years a lot of attention has been paid to perspective drawings as they give the most natural appearance to an object. By careful treatment and airbrushing they may be made to look like an actual photograph, with the added advantage that "cutaways", "explosions" and the like may be introduced. In the case of buildings, an apparent photograph may be produced when a camera cannot be located in a suitable position or even before construction is completed.

In the layout of such drawings, the time-honored terms like those described below have descended from ancient times. To assist in our layout work, a thorough investigation was carried out and certain new principles evolved which greatly aid the preparation of a drawing, and even make the use of special mechanical aids unnecessary.

Definition of terms

As a preliminary, standard definitions will be reviewed.

1. **Picture Plane.** Plane on which picture is projected.

2. **Point of Vision** (O). Foot of perpendicular from the eye to the projection. Normally this is at, or near, the centre of the picture.

3. **Visual Distance** (v). Distance of eye from projection—normally about 18 inches.

4. **Vanishing Point** (V). Point at which parallel lines converge in projection. For a rectangular prism there may be 1, 2 or 3 vanishing points, giving rise to three types of projection which will be considered in turn.

a) **1-Point or Oblique Perspective (fig. 1)**

This is often used as it is easy to draw. Since, theoretically, the eye should be perpendicularly above V this point should be at the centre of the picture, which is rarely practicable. It has the advantage, however, that any visual distance may be used.

b) **2-Point or Horizontal Perspective (fig. 2)**

In this form, the picture plane is parallel to the vertical edges of the object. The vanishing points V_1 and V_2 are on the horizon line and the visual distance is easily determined by drawing a semi-circle on this base, and being equal to the perpendicular at O. It invariably happens, however, that either V_1 or V_2 is inaccessible, but it is not generally realized that if perpendiculars are drawn from R and S to the opposite boundary lines therefrom, the perpendiculars intersect on the horizon line. Therefore if the horizon line is drawn through the accessible vanishing point, Rr and Ss may be drawn, with p thereon, and checked for a

continued ▶

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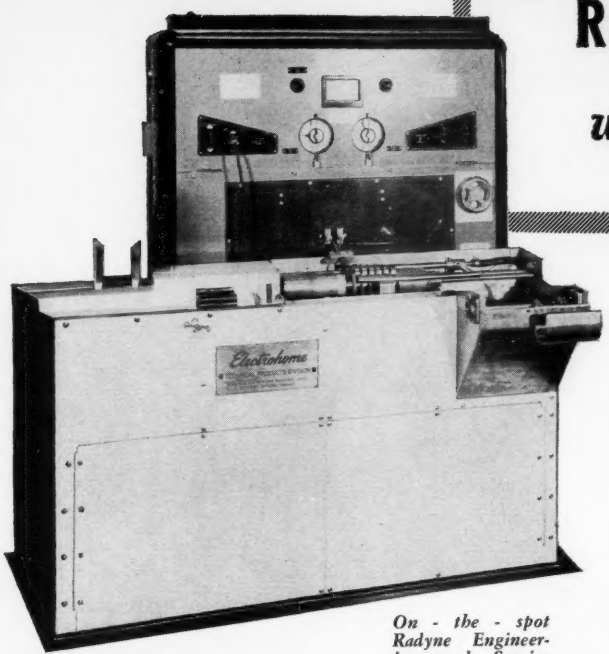

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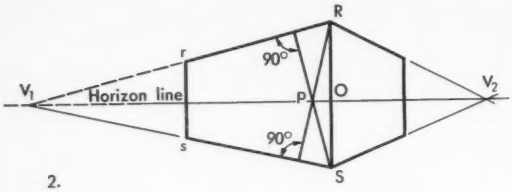

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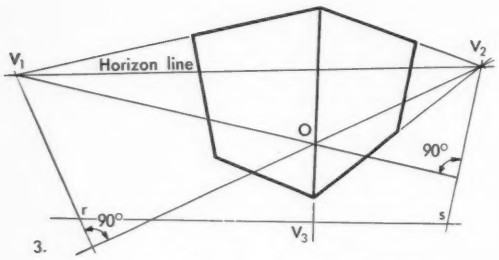

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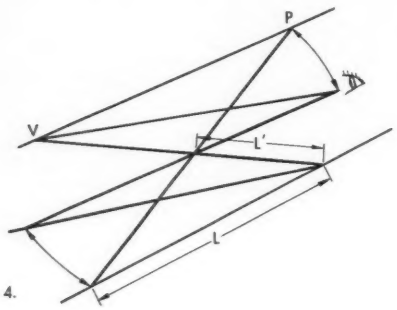

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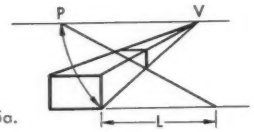

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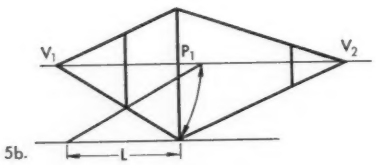

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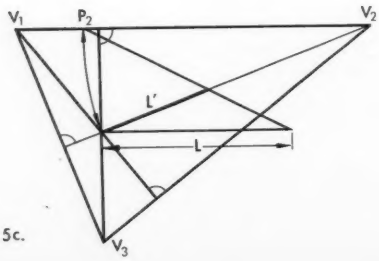

5c.

reasonable value of v. For intermediate lines, RS and rs may be divided in proportion, or a centrolineade used. It should be clearly understood that RS must be perpendicular to V_1V_2 but need not pass through O, which should be at the centre of the picture and always on V_1V_2.

c) **3-Point or General Case (fig. 3)**

The drawing shows the usual case where the lower vanishing point V_3 is completely inaccessible. V_1 or V_2 may also be inaccessible but in this case it will usually be advisable to extend the drawing sheet to avoid this. It is well known that a projection may be spoiled by badly chosen lines but it is not generally realized that the Centre of Vision O is at the ortho-centre of the triangle formed by the three vanishing points, which will be termed the ortho-triangle. Therefore if V_1 and V_2 are chosen, straight lines may be drawn through O, and perpendiculars drawn to them from V_1 and V_2 to meet at V_3. If this point is inaccessible, a centrolineade may be used or alternatively V_1V_2 and rs (on a parallel) divided in proportion. The visual distance is the height of a right-angled pyramid on $V_1V_2V_3$ which will be termed the ortho-pyramid (shown in fig. 4). This may be calculated trigonometrically or constructed geometrically and checked.

Linear dimensions

These have been deferred to avoid confusing the above discussion.

In the case of one V.P. dimensions on abcd are in proportion to the true lengths, whereas in two V.P. those on RS are in proportion to true lengths.

The method of projecting true distances for 2-point perspective fig. 5(b) is well known but it is not generally realized that this construction also applies to 1 and 3-point perspective, and in either case the proof is not usually considered. The latter case is indicated in fig. 4 by considering the similarity of two pyramids. The proofs of the other cases are practically the same, using a vertical picture plane.

General Note

Notwithstanding the indication that the visual distance should be checked to about 18 inches, perspective drawings are often enlarged or reduced without loss in aesthetic qualities. Also, deviation from strict geometric accuracy is often found desirable. The simplest cases have been considered above but in general any line joining two vanishing points may be considered as a horizon line. With regard to case (b) if the horizon line is above R the construction for p must be modified, but this should not normally occur, as O should be near the centre of the picture and 3-point projection becomes applicable.

It will be realized, of course, that a rectangular prism has been considered, but the same constructions apply to symmetrical buildings and details may be filled in for irregular items. ★

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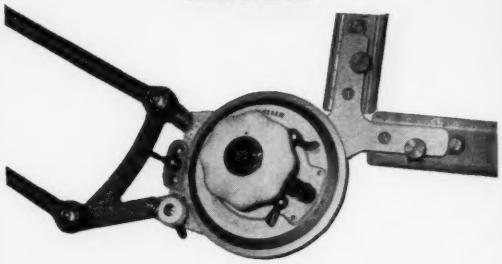

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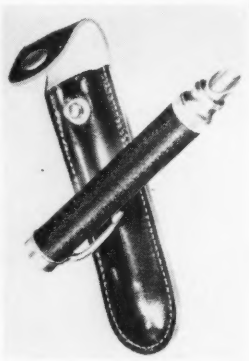

times. Objective end has a curved metal guard which reflects any light source (lamp, daylight, flashlight) to provide brilliant illumination and a vivid image of the object being examined. Only 3½ in. long, it has an adjustable lens for fine focusing. Black crinkle-finish barrel, with chrome parts. Includes pocket clip and pigskin case with snap fastener. **Leslie Creations.** **317**

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A soft-seat needle valve for either gas or liquid that gives "bubble-tight" service up to 6000 psi is introduced by **Republic Manufacturing Company.** It is ruggedly constructed, and a safety factor of 4 is assured. All internal parts may be removed and serviced without removing the valve from the line. Designed for panel mounting, up to a maximum thickness of ¼ inch.

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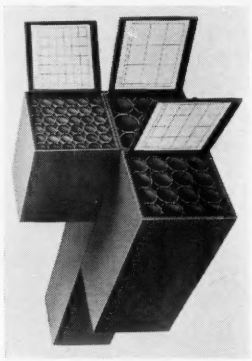
Roll file
A space-saving roll file line for rolled prints, charts, maps and drawings, manufactured by **Stacor Equipment Company,** has been enlarged to 24 sizes. The line now consists of three tube diameters in eight tube lengths.



The 15-5/16-in. square roll files are made of heavy gauge steel with a hard-baked gray enamel finish. Tubes are steel-rimmed for long life, include a new 16-tube, 3⅜-in. I.D. size, in addition to the 36-tube, 2¼ in. I.D. and 9-tube, 4⅜ in. I.D. sizes. Lengths range from 18 in. to 60 in. **319**

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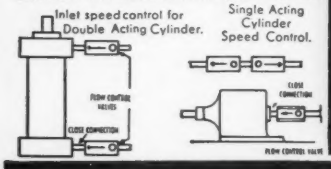

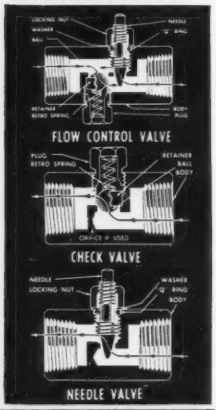

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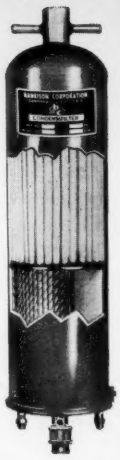

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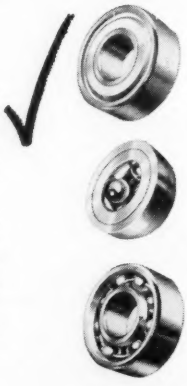

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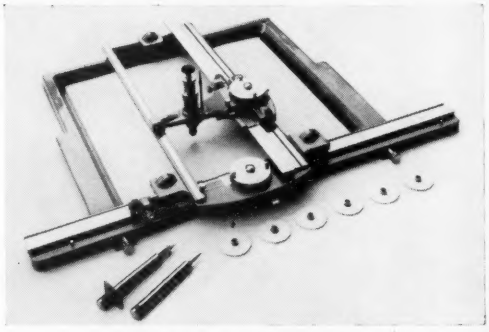

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Editorial

When first we accepted the role of editor, an old hand at the game suggested that our success would be measured by the number of "peeves" we were able to germinate.

This month we have managed to bring to light two of our "pet peeves" —incidentally DE welcomes your engineering peeves, too. Feel free to use the pages of this book to air your thoughts and discuss common problems.

As hinted in last month's issue, Alex MacDonald has researched and recorded the facts on the role of the Canadian engineer as a lawmaker. We urge you, as an engineer and citizen, to read it (see page 66), even if the facts do not make good reading.

Professional engineers are indeed shirking their responsibilities. Yes, we know about C. D. Howe — but can you name one other Canadian engineer who has made a mark in politics in the last decade or so? We can't.

What must we do about it? We could start by educating ourselves in these matters. Professional societies, for instance, could well afford to broaden their horizons — there is nothing so sterile as an engineer surrounded by a technological fence.

Drafting is the language of the engineer

. . . its benefits and responsibilities are many

Five different authors have helped us air our second peeve — the status of the engineering drawing office in Canada.

Drafting is the language of the engineer . . . its high stature in the Canadian business world automatically begets to it many benefits and obligations.

One of our authors describes the average Canadian drawing office as the "neglected step-child of management." If such is the case, then we must hasten to add that the fault is not all with management. **The men who work in the drawing offices must share a large part of that blame.**

- Is it management's fault if the engineering department fails to sell its own needs to that management?
- Is it management's fault if drafting personnel fail to keep themselves informed of the latest in drafting techniques? (When was the last time **you** read a text on functional drafting?)
- Is it management's fault if many so-called draftmen are merely "tracers" — refusing to accept responsibility for originating or developing an idea?
- Should we close our eyes when the philosophy of some drawing offices seems to be to do as little work as possible? The quality of a drawing is not always indicated by the length of the time required to complete it!

We are happy to report that not everywhere are things so black. In the past few weeks we have been privileged to look in on a number of excellent drawing offices; two such locations are associated with the Mathews Conveyor Company Limited in Port Hope, Ontario (see page 45), and with the Civilian Atomic Power Department of Canadian General Electric, Peterborough, Ontario. We can readily understand why these two organizations are fast outstripping their competition — new ideas and designs are bound to flourish where good working conditions exist.

The engineering profession incorporate, at least in Ontario, is beginning to recognize the part played by their draftsmen partners. Already hundreds of draftsmen have been certified under the Technician Certification Program of the A.P.E.O.

Just as the preacher is judged by his sermon, the author by his book, and the craftsman by his handiwork, so are engineers judged by the drawings that come out of their offices. Let's always strive to make them the best possible.

DE's editor back at the board

Doug Kaill

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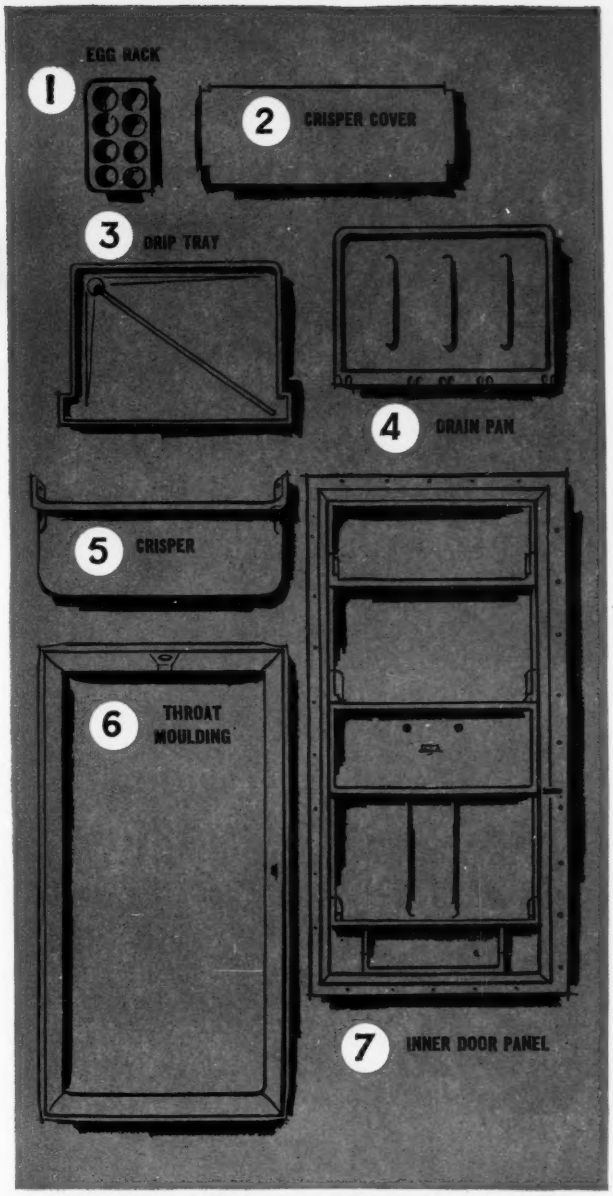

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